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Better Than A Boom

¶ The steel industry has come into better times after going through two revolutions in as many years.

¶ In 1923 it went from a 12-hour working day to an 8-hour day, with consequent adjustments whose full effects have not yet been measured.

¶ In 1924 came a Government edict overturning the system under which steel had been marketed in the United States for more than a generation. Steel makers and steel users look for many resulting shifts in their various spheres of competition, and are studying more intensively than ever their manufacturing and marketing problems.

¶ Apart from these basic changes, both producers and consumers of steel have found business beset with special difficulties in the past two years and the price of success steadily rising.

¶ Some are looking on the election result as a promise of fair weather. To have overwhelmed radicalism means much—yes. But the election has opened up no magic road to prosperity. It has done a better thing in showing how many millions of the American people think well of economy and the other old-fashioned virtues they find in the President.

¶ Business well may take its cue from that approval. If prices have not been satisfactory, simply getting them higher, where that is possible, will not be a cure-all. There must be a steady pushing forward of the work on which some far-seeing producers have been making good headway—stopping waste, increasing output per man, and cutting cost of marketing.

¶ That program sounds familiar; but it would be a mistake to put it aside and just join the shouters for an easy boom, even if that would bring it.

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A Record of Achievement

Less than three years have elapsed since The Koppers Company's Becker type combination coke and gas oven was introduced. In this time contracts for seventeen installations totaling 1099 ovens of the Becker type have been received. Twelve of these plants are now in operation, demonstrating in actual practice that this type of oven is a marked improvement over all previous types from the standpoint of design, construction and operation.

PLANTS OF THE BECKER OVEN TYPE IN THE UNITED STATES AND CANADA

COKE PLANTS	LOCATION	NO. OVENS
U. S. Steel Corp.		
Carnegie Steel Company	Clairton	366
Illinois Steel Company	Gary, Ind.	138*
Republic Iron & Steel Co.	Youngstown, Ohio	61
Republic Iron & Steel Co.	Birmingham, Ala.	57*
Weirton Steel Company	Weirton	37
Columbia Steel Company	Provo	33
Trumbull-Cliffs Furnace Co.	Warren, Ohio	47
Diamond Alkali Co.	Painesville, Ohio	23
Bethlehem Steel Company	Buffalo, N. Y.	114
By-Product Coke Corp.	So. Chicago, Ill.	110*
GAS PLANTS		
Battle Creek Gas Company	Battle Creek, Mich.	11
Consumers Power Company	Saginaw River Plant	19
Consumers Power Company	Jackson, Mich.	15*
Winnipeg Electric Co.	Winnipeg, Canada	17
Utica Gas & Electric Co.	Utica, N. Y.	21
Northern Ind. Gas & Elec. Co.	Fort Wayne, Ind.	19*
Lynn Gas & Elec. Co.	Lynn, Mass.	11*

*Under Construction

The KOPPERS CO.

PITTSBURGH, PENN.

New York City
120 Broadway

Chicago, Ill.
Peoples Gas Bldg.

THE IRON AGE

New York, January 1, 1925

ESTABLISHED 1855 VOL. 115, No. 1

As 1924 Passes, 1925 Looms Large

Steel Industry Met Various Handicaps in the Past Twelve Months, While Prices and Profits Fell—Revival Came Near the End of a 67 Per Cent Year

MEN in the steel trade a year ago looked for 1924 to fall somewhat below the remarkable year 1923 in volume of business and profits, but in both respects it fell farther below than they expected. It was appreciated that demand in 1923 represented in part a making up for what the coal and railroad strikes had taken out of 1922 and therefore that its immediate repetition was not likely. It was not so well realized, however, that in pig iron and to a less extent in steel there had been an overproduction in 1923, and that the continuance of the overdoing into the early months of 1924 would invite reaction.

Also there was no thought at the opening of the year that confidence would be so shaken and business so upset by the indiscriminate attacks and the revelations in the oil investigation or by the blow dealt by the wrong attitude of Congress on taxes and the bonus. Nor was it foreseen a year ago that prolonged cold and wet weather over so large a part of the country in the spring months would be so costly to trade in every line.

Looking Into 1925

Over against these disappointments of 1924 the current predictions for 1925 show that confidence has been growing steadily since the election and that the expectation is general of a good increase over the steel consumption of the year just ended, just as 1923 showed a marked gain over 1922. Counting 1924 as a 67 per cent year, some prophecy of what is to be seen in 1925 may be found in the fact that December has brought an 80 per cent operation at steel works at a time of the year when slowing down is commonly seen. The election result has set in motion forces that, barring the unexpected, should work out in a very considerable increment of steel consumption this year in channels that were not well filled in 1924.

The Year in Brief

AT no time in 1924 were mills heavily booked or buyers heavily stocked. Steel company earnings were unsatisfactory. After three months of overproduction, steel works began curtailing, and prices and output declined steadily. From August on output increased each month to the end.

The election result brought confidence, and there was good buying, though at the year's lowest prices. The market tended upward and the outlook grew much more favorable as the year ended.

As 1923 was made epochal by the abolition of the 12-hour day at steel mills, 1924 brought another revolution in the Federal Trade Commission order ending the system of many years, under which steel was sold all over the country at the Pittsburgh mill price plus freight to destination. Lower prices on some products were a result in western markets.

In 1924 steel ingot output was about 36,500,000 tons, or 16 per cent below the 43,485,000 tons of 1923, which was next to the high record of 1917. Counting capacity at 54,000,000 tons, 1924 was a 67 per cent year.

In pig iron, 1924 fell 9,000,000 tons below 1923, while the falling off in steel was about 7,000,000 tons. At 31,100,000 tons, the 1924 pig iron output represents 66 per cent of capacity.

Three Swings in Production

Nineteen twenty-four saw three marked swings in the production curve. Early in January the industry stepped up to a higher rate of buying and of mill operation. This was increased in February and reached its climax in March, when the ingot output was at an annual rate of 50,000,000 tons, or nearly 93 per cent of the total productive capacity—the greatest month in the country's history. Then followed shrinkage for four months, the low point being reached in July at 41 per cent of capacity. The third movement covered the last five months of the year, with a steady gain that brought December output, roundly 3,500,000 tons, nearly back to that of January.

Price Decline Was Orderly

Finished steel prices in 1924 showed a resistance to downward tendencies that was an outstanding phenomenon of the year. This resistance was plainly recognized also in 1923, when, for the seven months following April, while pig iron fell $9 to $10, important rolled products

were held close to the April, 1923, basis of prices.

The large steel companies found early in 1924 that the 1923 price level, represented by 2.50c. for plates, shapes and bars, could not be maintained. But they kept adjusting their operations to the demand and so prevented demoralization. That process is quite in contrast with the policy of the Carnegie days, when it was preached that "the way to lift the market is to get under it."

There is no mistaking the stabilizing influence exerted in recent years by the Steel Corporation and four or five of the larger independents in such markets as have been seen in the past 18 months. Sales policies, not by agreement, but on the initiative of each of the large companies, have shown that the men now in places of leadership are not disposed to try, by freely cutting prices, to get an inordinate share of going business for their respective mills when demand is falling considerably short of capacity.

Selling Was Not Aggressive

There is also the fact, overlooked by some who write of the steel industry, that every steel company does a very considerable part of its business with "regular customers." This means that, while such customers will not pay more than the "going" price, at the same time one steel company does not set to work aggressively at buying time to get another company's more or less regular customers away from it by naming a cut price. Under conditions such as prevailed in 1924 from spring to fall, when capacity was all the time well above consumption, price concessions were sure to be made. But sellers gave ground gradually and not by indiscriminate cutting.

Sparing Inventories

In such a situation, also, consumers had no inducement to buy far ahead. They were in a falling market and naturally formed the habit of small and frequent buying. The effect of this on the seller, in turn, was to reduce his temptation to cut. From February on until the election the hand-to-mouth character of the buying was marked. For no equal stretch since the depression of 1921 had buyers so held down their inventories or maintained such close connections with the steel mills. And for nearly all the year the trend of the market was downward, but gradually downward. What the steel companies had been able to do throughout most of 1923, in holding finished steel products close to the April level, could not be repeated in 1924. There was too much unoccupied capacity, and too many other industries were less prosperous than in 1923.

Sources of Demand

Railroad buying was an important factor in the first four months of the year and during the last five months, but dropped to a low point in May, June and July. In the early part of the year the plans of the railroads seemed to look to relatively larger expenditures in 1924 for bridges and track betterment than for rolling stock. Producers of rails, tie plates and track supplies had a relatively better operation for most of the year than did mills supplying car and locomotive steel. However, 1924 car contracts, in part because of the revival in buying that came in the fall and continued through December, yielded a total of about 136,000 cars, as compared with 92,000 cars ordered in 1923. A better measure of the extent to which new car demand actually drew upon steel works in 1924 is afforded by the record of freight cars built last year. The number was 97,626, as against 149,878 cars in 1923.

Building construction promised early in the year to come closer than any other of the important lines of consumption to equaling its record for 1923, and in most districts the volume of structural work was quite satisfactory. Following the election, in what is usually a quieter time in building, there was a decided pick-up, particularly in the West.

Demand from automobile makers was strong in the opening months, but began to fall off in March as it appeared that motor car builders had overstocked against spring buying. Through the year the automobile trade pursued a conservative policy in respect to steel, its total takings being 15 per cent or more below those of 1923.

Farm implement manufacturers had a slight spurt in output very early in the year, but then fell back into slack operations, which continued well into the fourth quarter. They are now slowly increasing output, with prospects the best since 1920 owing to the good progress already made in the repair of farmer finances.

The petroleum industry continued its pace of overproduction in 1924, a condition that operated against the bringing in of new wells. Thus the demand for oil country pipe and supplies was less than in 1923, and the Southwestern and Pacific pipe line tonnage was only moderate. A fair amount of tank work came to the plate mills, however. In merchant pipe tube mills fared well, their percentage of operation being above the average of finishing mills in other lines.

The year was disappointing in respect to tin plate demand for food containers, but the present outlook is that 1925 will be a tin plate year of the first magnitude.

Ups and Downs of Output

Reference was made above to the three distinct swings in steel production last year. Entering the year on the up-grade, operations were at a further increased rate in February and reached the peak in March, when the ingot output was at an annual rate of 50,000,000 tons, or nearly 93 per cent of the total production capacity. At the low point in July the rate was but little over 22,000,000 tons a year, while in December it had come up to a yearly rate of 42,000,000 tons.

The year's steel ingot output may be estimated at about 36,500,000 tons and that of steel castings at about 1,150,000 tons (against 1,458,031 tons in 1923), making the total of steel ingots and castings roundly 37,650,000 tons. The comparison with the high war years and the years following is given in the table below:

	Pig Iron, Gross Tons	Steel Ingots and Castings, Gross Tons
1916	39,434,797	42,773,680
1917	38,621,216	45,060,607
1918	39,054,644	44,462,432
1919	31,015,364	34,671,232
1920	36,925,987	42,132,934
1921	16,688,126	19,783,797
1922	27,219,904	35,602,926
1923	40,361,146	44,943,696
1924	31,100,000*	37,650,000*

*Estimated.

We estimate pig iron production for 1924 (including charcoal iron, of which monthly statistics are not collected) at 31,100,000. The following statement gives the number and daily capacity of the furnaces in blast at the beginning of each month. There is quite a contrast with 1923, for in that year no fewer than 323 furnaces were in blast at the high point (July 1), with capacity of 122,555 tons a day. The largest number in blast in 1924, it will be seen, was 270, on April 1, and their capacity 112,240 tons a day. At low point on Aug. 1 pig iron capacity was at a yearly rate but little over 22,000,000 tons:

1924	No. in Blast	Daily Capacity, Gross Tons	1924	No. in Blast	Daily Capacity, Gross Tons
Jan. 1	231	94,265	July 1	161	62,200
Feb. 1	248	101,435	Aug. 1	144	55,350
Mar. 1	264	108,100	Sept. 1	150	63,070
April 1	270	112,240	Oct. 1	173	72,235
May 1	230	96,635	Nov. 1	182	81,490
June 1	184	77,300	Dec. 1	205	89,100

The variations in the average daily rate of steel ingot output from month to month are shown below:

Months, 1924	Daily Production, Gross Tons	Months, 1924	Daily Production, Gross Tons
January	134,597	July	71,901
February	152,367	August	97,750
March	161,075	September	108,269
April	128,213	October	115,239
May	97,343	November	124,289
June	82,259	December	.....

Plates Led in the Decline

The influence of the larger steel companies in keeping the decline from becoming a disorderly one was more marked in bars, structural shapes and pipe than in some other products. Plates were particularly weak, and the weakness was most marked in the East, the territory nearest to the large independent plate mills at Sparrows Point, Conshohocken, Ivy Rock, Coatesville, Bethlehem and Harrisburg. Companies producing only plates were at a disadvantage in competing with those having a full line of products, for the latter would take on, at an attractive price, all the plates, shapes and bars involved in a car or structural contract. There were, in this particularly sharp competition on plates, the concessions always made to car works. Thus the fall in plates was more than on other products, being represented by 2.50c., Pittsburgh, at the opening of the year and 1.55c., Pittsburgh, on $19 a net ton less, in September and October.

An Unusual Year in Sheets

Sheets are the other outstanding example of a product in which, due to the large number of producers, there was difficulty in putting brakes on the decline. The Steel Corporation's share of the capacity in sheets is less than in other important products, being around 25 per cent, and thus the stabilizing influence of its prices is not marked in sheets. At the opening of the year 3.75c. was commonly the market on No. 28 black sheets. In February and a part of March the high point of the year was reached at 3.85c. Then came an irregular decline, with at times pronounced weakness, July and August developing 3.40c. and slightly lower. A number of producers, chiefly those that were buyers of sheet bars, sought to maintain a higher rate of operations than the demand warranted for the whole industry. When prices were at their lowest, some members of the trade were disposed to put the onus on the trade press, apparently taking the view that the recording of a market condition involves greater responsibility for it than actually producing it.

LARGE SALES ON A DECLINING MARKET

A phenomenon of the year in sheets was that in the face of steadily declining prices in the third quarter and of weakness continuing into October, there should be in those months a steady increase in sales, production and shipments. As is well known, declining prices are ordinarily accompanied by restricted buying. But 1924 was a good year in sheets, measured by volume, second only to 1923. The production of independent companies in 1924 represents about 76 per cent of their capacity, as against an 81 per cent year in 1923. There might have been a fair profit last year, as in 1923, but for the fact that a number of mills set out for a larger operation than the majority of producers were averaging.

The volume of sheet business in the last four months of the year showed that consumers had gone to the limit in living off their stocks—a perfectly natural course in view of the weakness of prices. Members of the National Association of Sheet and Tin Plate Manufacturers (operating about 95 per cent of the independent mills) had record bookings in November, at 462,000 tons, representing 164 per cent of their monthly capacity. As December opened they had 531,845 tons of unfilled orders, an amount probably never exceeded unless at the time of the steel and coal strikes.

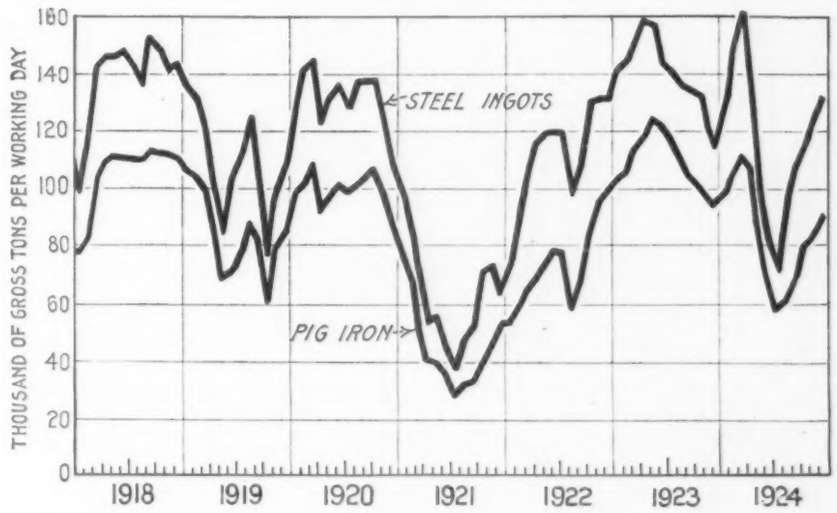
Sheet makers were particularly affected by the slump in the automotive industry. In previous years the output of automobile body sheets had not been in excess of demand, but not a little additional capacity in this line had been built and competition became sharper. Hot rolled strip steel was also a weak point as prices sagged, this product competing closely with plates and sheets.

Passing of Pittsburgh Basing

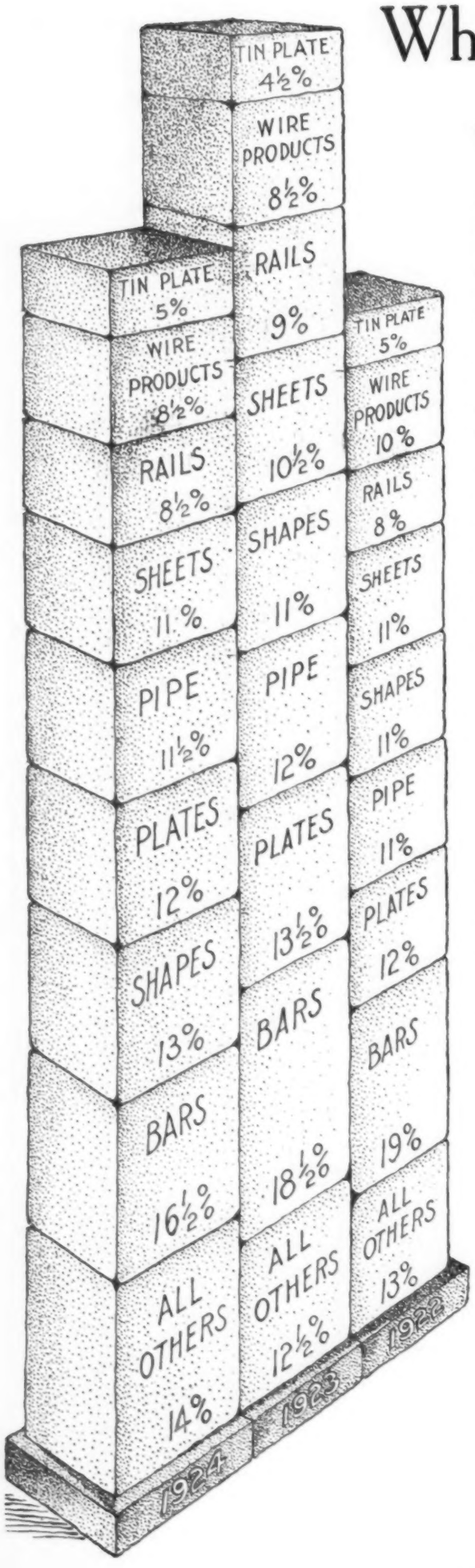
The celebrated case of the Pittsburgh base came to an end in 1924 so far as the Federal Trade Commission could end it. It had been before the commission for about five years, and the last proceeding was directed solely against the United States Steel Corporation. On July 22 the commission ordered the Steel Corporation to cease within 60 days from selling at Pittsburgh plus prices and thereafter to quote either delivered prices or prices at a designated mill, indicating in the case of

(*Continued on page* 48)

FLUCTUATIONS in Daily Average Production of Steel Ingots and of Pig Iron During the Past Seven Years Show Considerable Parallelism. Monthly ingot figures of the American Iron and Steel Institute and pig iron figures of THE IRON AGE tell the story



Where Steel Went in



WHAT steel was made in 1924 and how it went into consumption is told by the accompanying illustrations and tables. They show that structural steel was relatively more important last year than in 1923 and that both railroads and the building and construction industry increased their proportionate takings as compared with 1923, while neither the automotive industry nor the oil industry was quite as important as in the preceding year. As a whole the year fell off nearly one-sixth in tonnage of rolled steel from the total of 1923, but with about 27 million tons it is somewhat better than 1922, which produced 25.5 million tons.

Estimates of production and of distribution were supplied in the last few days of December by rolling mills making 82 per cent of the country's production this past year. It is through this cooperation of the steel producers that it becomes possible immediately at the end of the year to give the analysis of both production and consumption with all the suggestions which the figures may supply in respect to company policies for the new year.

An outstanding point of the showing is the apparent drop in steel bar tonnage, though the official total available later this year will undoubtedly be larger by including bars not rolled from billet steel.

Outstanding also is the higher proportionate amount of rolled steel coming from structural mills. Thus, though the amount of all rolled steel was less than 84 per cent of that for 1923, substantially equal tonnages of structural shapes were rolled in the two years.

Railroad consumption still heads the list of consuming industries and the returns indicate that the railroad percentage is nearly 28 for 1924 against something more than 27 for 1923. This showing is made in the face of an 18 per cent drop in rail production from 1923 against a 16 per cent drop averaged for all forms of steel.

Production About One-Sixth Off from 1923

Structural Steel Output About Same as 1923 and Railroad Takings Not Far Behind. Drop in Automotive and Oil Industries

Nineteen Twenty-Four

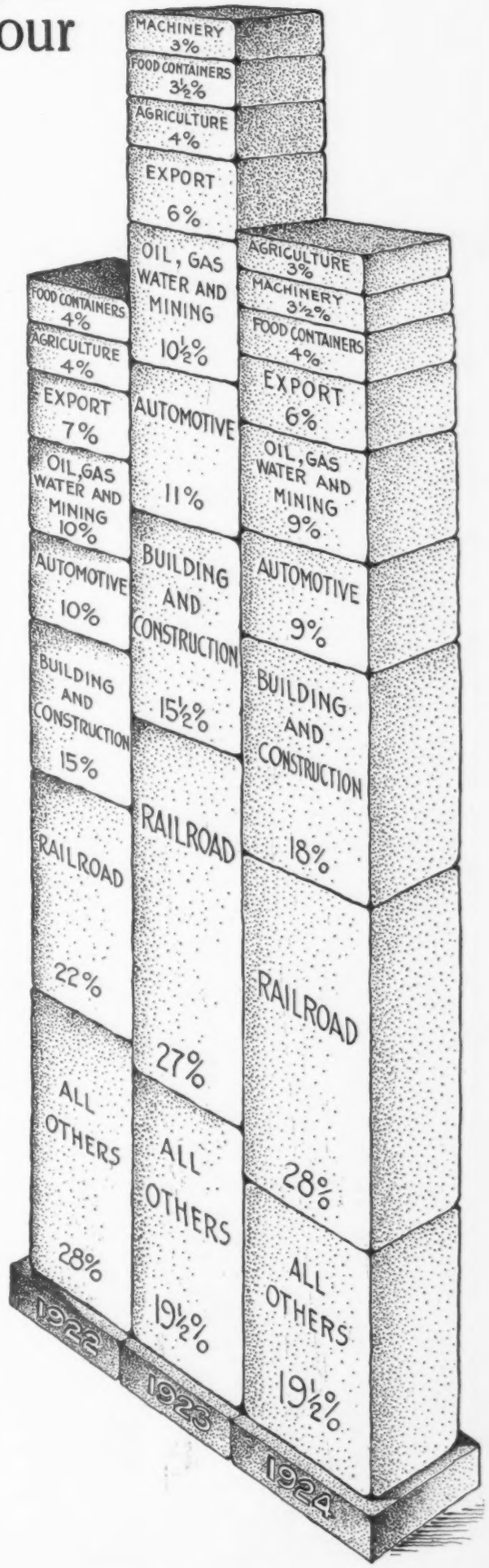
Building and construction work took nearly as much steel in 1924 as in 1923.

The apparent drop in the amount of steel going to the automobile industry is over 900,000 tons, and for the oil and mining enterprises the decrease in consumption is substantially as large.

The diagrams on these pages are proportioned to show the relative volumes taken by the industries, and the percentages of the different chief forms of rolled steel. They are intended to show at a glance the relationship among these divisions for the past three years. Besides the major drawings, there is a chart on page 6 showing by industries the kinds of steel taken by each and the relative importance of these kinds of steel to the industry, and on page 7 a chart showing how much of each steel product is sent to the different industries. In connection with each of these charts, is a table showing the percentages in detail. For example, the table on page 6 shows for the automobile industry what percentage of the steel required for automobile manufacture was supplied in the form of bars or in sheets. Similarly, the table on page 7 shows how much of the total production of wire products, for example, was taken by the building industry or by the railroads or was exported.

On page 8 is a table which shows in units of 1000 gross tons the distribution of steel for 1924. From this one may gather what tonnage of rails was taken by the railroads or what tonnage of structural shapes was used by the building industry or what amount of plates was required for the making of tanks in oil developments. Estimated totals give the entire consumption for the different industries and for the entire production of the different forms of steel.

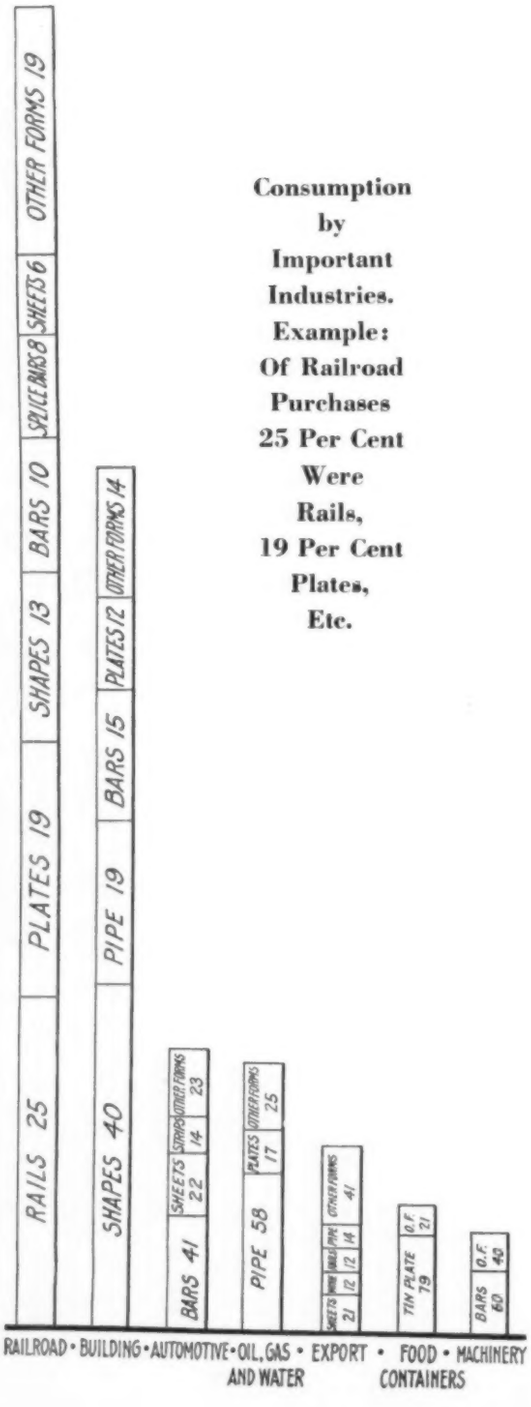
As was the case in 1923, nearly two-thirds of all steel was absorbed by the combined demands of railroads, building and construction work, automobiles and what may be classed as oil and mining developments. The percentage of steel



Nearly Two-Thirds of the Steel Was Absorbed by Railroads, Building and Construction Work, Automobiles and What May Be Classed as Oil and Mining Developments

Forms of Steel Different Industries Took in 1924, Showing Percentages Making Up the Total for Each Industry

	Rails	Splice Bars, Tie Plates, etc.	Plates	Shapes	Bars	Sheets (not inc. black plate for tinning)	Tin Plate	Wire Products	Pipes and Tubes	Hoops Bands, Strip Steel, etc.	Forging Blooms and Billets	All Other
Automotive (inc. trucks, tractors, etc.)	..	1	8	1	41	22	..	4	1	14	1	7
Railroads (inc. cars and locomotives)	25	8	19	13	10	6	..	1	1	1	3	13
Agriculture	..	..	5	2	18	10	..	46	..	3	11	5
Bldgs., bridges and other Const. (Not R.R.)	..	..	12	40	15	5	..	6	19	1	..	2
Shipbuilding	2	..	48	23	16	2	..	1	1	..	..	7
Food containers	..	..	..	..	..	11	79	2	..	6	..	2
Machinery (elec., textile, machine tools, etc)	..	..	10	7	60	3	..	7	..	2	..	11
Oil, gas and water	4	1	17	5	5	4	2	1	58	1	..	2
Exports	12	1	8	8	6	21	11	12	14	2	..	5
Miscellaneous	1	1	5	4	19	15	5	22	10	3	2	13



Consumption by Important Industries. Example: Of Railroad Purchases 25 Per Cent Were Rails, 19 Per Cent Plates, Etc.

exported was the same as last year, and therefore about one-sixth less than for 1923. The heavy tonnage products—bars, plates and shapes—accounted for 41½ per cent of the 1924 total against 43 per cent in 1923, and 42 per cent in 1922.

The amount of steel consigned to jobbers appeared to be 13.2 per cent, based on the returns of companies making 25.4 per cent of the rolled steel last year. All of the steel makers did not attempt to show sales to warehouses. The amount of steel distributed by the warehouses was subsequently allocated by THE IRON AGE to the different channels of consumption with attention paid to the character of the warehouse business.

An innovation in the analysis has been made this year by indicating how much of the country's capacity in each form of rolled steel was required to satisfy demand. The information is shown in the form of a chart at the top of page 8. Along one side is listed the capacity of the rolling mills, and on the other side the percentage of that capacity which was in production, averaged for the year. Capacity figures are based on the records of the American Iron and Steel Institute. Incidentally they are to be found on page 9 of this issue. As explained on page 16 in the article referring to the country's steel-making capacity, the combined total of rolling mill capacity is 23 per cent greater than the country's finished steel capacity working back to the ingot. The excess factor is accounted for in part by the fact that mills for one form of steel are adaptable to turn out some other form, and also that simultaneously all forms of steel would not be in equal demand. What the chart on page 8 particularly emphasizes is the large percentage of occupation of the structural steel mills in 1924 and the relatively large capacity of the country in plates.

Record Steel Building Year

The importance of steel building construction in 1924 is shown by the records of the Bureau of the Census covering the contracting of fabricated steel work. With December estimated the awards of 1924 appear to exceed 2,150,000 tons, compared with 2,000,000 in 1923, then a record. The showing is for structural mill activity in the early months of 1924 as a result of the expansion in steel building business.

The 3,200,000 passenger automobiles built in 1924 are estimated to have absorbed 2,123,000 gross tons of finished steel and 1,092,000 gross

What Percentage of Each Form of Steel Was Distributed in 1924 Among the Industries

	Automotive	Railroads	Agriculture	Buildings and Const'n	Shipbuilding	Food Containers	Machinery	Oil, Gas, Water and Mining	Exports	Miscellaneous
Rails	..	82	..	..	..	..	..	4	10	4
Splice bars, etc.	..	86	..	..	..	..	..	2	3	9
Plates	6	43	..	18	3	..	2	13	4	11
Shapes	1	27	..	55	1	..	3	3	4	6
Bars	23	18	4	17	1	..	12	2	2	21
Sheets	22	18	3	8	..	5	1	3	13	27
Tin plate	..	..	..	..	..	66	..	4	13	17
Wire products	5	3	17	13	..	1	3	2	9	47
Pipes and tubes	1	1	..	29	..	..	..	45	7	17
Hoops, bands, strip steel, etc.	41	7	3	6	..	8	2	3	3	27
Forging billets and bloom	5	24	4	4	4	..	..	4	..	55
All other	8	46	2	4	1	..	5	2	3	29

tons of castings, including malleable castings. The 360,000 trucks are estimated to have required 234,000 gross tons of steel and 202,000 gross tons of cast iron. The total consumption, not allowing for manufacturing wastes, was thus 2,357,000 gross tons of finished steel and 1,294,000 gross tons of malleable and other iron castings.

The capacity of the sheet steel industry has been increased. There were 679 hot mills in existence in the first quarter of 1924 and 686 throughout the rest of the year. The mean number in 1923 was about 670.

Railroad Consumption

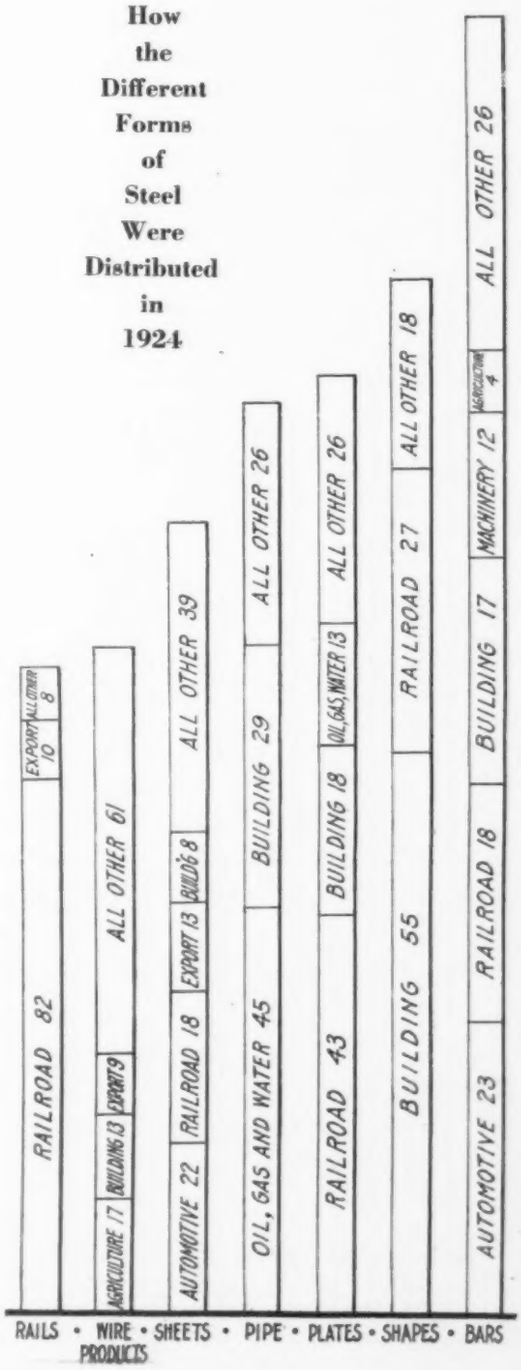
In addition to large tonnages of rails and track accessories and the miscellaneous requirements for shop work and road maintenance, the railroads ordered 136,038 freight cars in 1924, December being estimated at 9526, while the first 11 months showed 126,512. What is more important from the standpoint of steel consumption is the fact that they received from the car builders 97,626 freight cars (including 1288 built for export), with December estimated under this heading also.

In car building the situations of 1922, 1923 and 1924 have shown successive reversals. Thus in 1922 the number of cars built, 65,000, was much less than half the number ordered, 170,000. In 1923 the number built, 150,000, was much greater than the number ordered, 92,000. In 1924 again, the number built, 98,000, was much less than the number ordered, 136,000. Unfilled orders to a considerable extent extend over into 1925.

Cars delivered to the railroads in 1923, with December estimated and with unclassified reports apportioned pro rata, and again including the export figures, were of the following types:

Type of Car	Number Built	Average Tons of Steel Per Car	Total Steel Used, Net Tons
Box	49,941	13	649,233
Flat	1,746	10	17,460
Stock	2,041	10	20,410
Gondola	6,802	14	95,228
Hopper	26,692	17	453,764
Tank	1,328	15	19,920
Refrigerator	5,890	10	58,900
Caboose	296	9	2,664
Others	2,890	15	43,350
Total	97,626		1,360,929

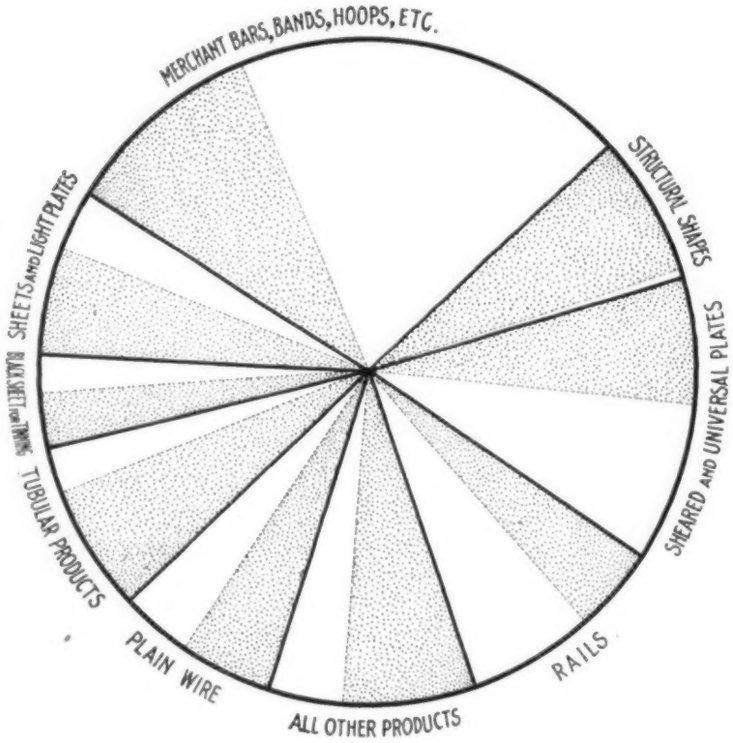
Foreign orders for cars during the year formed a small percentage of the total. Only 1288 cars were built for foreign shipment, these being included in the above table to show the steel used.



How Finished Steel Production in 1924 Was Related to Capacity

Annual Capacity Millions of Gross Tons	
Rails	5.8
Plates	7.3
Shapes	3.7
Bars*	15.4
Sheets	4.3
Tin Plate	2.3
Pipe	4.4
Wire	4.1
Other	5.6
	52.9

*Includes hoops and bands.



Production in 1924 Per Cent of Capacity	
Rails	38
Plates	44
Shapes	95
Bars*	33
Sheets	63
Tin Plate	59
Pipe	71
Wire	56
Other	62

*Includes hoops and bands.

SECTORS SHOW RELATIVE CAPACITY OF COUNTRY'S FINISHING MILLS AND SHADED AREAS SHOW WHAT PART OF EACH WAS TAKEN FOR 1924 PRODUCTION

Locomotive shipments from manufacturers during the first 11 months of 1924 are reported by the Department of Commerce at 1323 units, of which 133 were for export and 1190 for American railroads. Estimating December shipments at the same average monthly rate, the total for the year would be 1443 locomotives shipped for both domestic and foreign roads. Locomotives are becoming heavier. One of the largest builders states that the average weight in 1924 of its locomotives, without water or fuel, was 190 net tons, compared with 167 tons in 1923 and with 142 tons in 1922. Of the 190 tons it is estimated that about 160 tons represents steel, including castings and forgings.

Making allowance for the considerable number of switching and other smaller locomotives turned out by some of the other companies, the total weight of the average American locomotive built in 1924 may be estimated at 170 net tons, of which 145 tons represents iron and steel. New locomotives built during the year, therefore, apparently called for about 209,235 net tons of steel. This figure is far lower than in 1923, because the number of locomotives built is only 36 per cent of the number built in 1923. As the average size of locomotive, however, is considerably greater, the tonnage of iron and steel used is practically 50 per cent of that for the preceding year.

ESTIMATED CONSUMPTION OF STEEL IN 1924

(Thousands of Gross Tons)

Approximate Amount of Each Form Taken by Each of a Number of Industries

	Rails	Splice Bars, Tie Plates etc.	Plates	Shapes	Bars	Sheets (not inc. black plate for tinning)	Tin Plate	Wire Products	Pipes and Tubes	Hoops, Bands, Cotton Ties, Strip Steel, etc.	Forging Blooms and Billets	All Other	Totals
Automotive (inc. trucks, tractors, etc.)	....	24	205	24	1,035	615	....	105	27	345	16	125	2,511
Railroads (inc. cars and locomotives)	1,860	600	1,380	968	780	525	1	68	42	58	210	960	7,452
Agriculture	3	....	38	13	150	95	....	385	1	24	95	33	837
Bldgs. (bridges and other const., not R.R.)	8	2	575	1,940	740	250	....	290	910	55	....	70	4,840
Shipbuilding	5	....	115	55	38	6	....	3	2	2	....	12	238
Containers (principally food)	....	....	4	....	3	130	895	26	5	66	....	....	1,129
Machinery (elec., textile machine tools, etc.)	....	1	92	69	550	29	....	63	2	17	2	99	924
Oil, gas, water and mining	89	15	417	118	108	95	56	40	1,400	27	4	28	2,397
Exports	204	24	138	133	100	375	180	207	228	27	....	54	1,670
Miscellaneous	51	36	275	210	960	855	235	1,115	500	231	26	540	5,044
Totals	2,220	702	3,239	3,530	4,464	2,975	1,367	2,302	3,117	852	353	1,921	27,042

Steel Capacity in the United States
Where, How Much and What Is Made

Fourteen Geographical Groups and Relative Importance of Productive Capacity of Each—Detailed Figures for Each Plant

WHAT the country's productive capacity in steel ingots is in different steel making sections is shown in the tables on this and the immediately succeeding pages. As an answer to the repeated question respecting the relative importance of different steel making districts, the compilation will be of great service. It covers also productive capacity in the principal forms of finished rolled iron and steel, giving the detailed figures for every known steel works or rolling mill in existence at the end of 1922.

Thus in addition to establishing the dominance of localities in raw steel, one may ascertain the capacity of plants and also of districts in steel rails, structural shapes, merchant bars and the like. The information

(*Text continued on page* 17)

Annual Capacity of Finished Rolled Iron and Steel in the United States on Dec. 31, 1922, Subdivided into Fourteen Producing Districts.

Name of District	Plants	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)								
				Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Incl. Seamless Tubes)	Wire Rods	Plain Wire (Net Tons)
Eastern	U. S. Steel Corp.	179,000	27,000	.....	.....	.....	27,000	.....	.....	.....	138,000	181,400
	Other Plants	450,100	683,800	.....	6,000	.....	647,800	.....	.....	30,000	54,800	9,600
	Total—All Plants	629,100	710,800	.....	6,000	.....	674,800	.....	.....	30,000	192,800	191,000
Philadelphia	U. S. Steel Corp.	240,000	220,000	.....	.....	190,000	30,000	.....	.....	.....	130,000	170,000
	Other Plants	6,664,050	6,009,460	1,093,500	1,800,500	987,500	1,464,360	142,600	93,000	428,000	161,000	156,000
	Total—All Plants	6,904,050	6,229,460	1,093,500	1,800,500	1,177,500	1,494,360	142,600	93,000	428,000	291,000	326,000
Johnstown	U. S. Steel Corp.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Other Plants	2,124,850	1,236,360	240,000	331,920	184,800	479,640	.....	.....	.....	120,000	95,000
	Total—All Plants	2,124,850	1,236,360	240,000	331,920	184,800	479,640	.....	.....	.....	120,000	95,000
Buffalo	U. S. Steel Corp.	.....	23,000	.....	.....	.....	.....	.....	.....	23,000	.....	.....
	Other Plants	2,760,900	1,731,300	500,000	240,000	140,300	771,300	80,000	.....	.....	162,000	96,800
	Total—All Plants	2,760,900	1,754,300	500,000	240,000	140,300	771,300	80,000	.....	23,000	162,000	96,800
Pittsburgh	U. S. Steel Corp.	7,973,375	6,908,700	1,511,500	1,369,000	840,000	1,581,800	419,800	199,100	987,500	595,000	474,000
	Other Plants	5,378,340	5,053,300	96,000	616,000	406,500	2,124,800	510,000	465,000	835,000	624,800	651,000
	Total—All Plants	13,351,715	11,962,000	1,607,500	1,985,000	1,246,500	3,706,600	929,800	664,100	1,822,500	1,219,800	1,125,000
Wheeling	U. S. Steel Corp.	1,247,750	704,900	.....	.....	.....	65,000	285,500	197,400	157,000	.....	.....
	Other Plants	1,343,000	1,299,900	.....	130,000	.....	168,000	338,400	403,500	260,000	.....	.....
	Total—All Plants	2,590,750	2,004,800	.....	130,000	.....	233,000	623,900	600,900	417,000	.....	.....
Valley	U. S. Steel Corp.	2,854,000	1,243,530	.....	84,000	.....	775,400	43,500	340,600	.....	150,000	112,000
	Other Plants	4,528,000	3,036,400	.....	589,000	.....	929,000	710,400	130,000	678,000	149,600	126,000
	Total—All Plants	7,382,000	4,279,900	.....	673,000	.....	1,704,400	753,900	470,600	678,000	299,600	238,000
Cleveland	U. S. Steel Corp.	2,315,000	886,900	207,000	.....	.....	143,000	.....	26,900	510,000	508,000	483,000
	Other Plants	1,345,700	980,000	.....	316,000	.....	417,500	210,500	.....	36,000	.....	.....
	Total—All Plants	3,660,700	1,866,900	207,000	316,000	.....	560,500	210,500	26,900	546,000	508,000	483,000
Columbus	U. S. Steel Corp.	200,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Other Plants	2,982,000	2,169,475	136,000	75,000	.....	819,600	866,875	70,000	202,000	100,000	81,000
	Total—All Plants	3,182,000	2,169,475	136,000	75,000	.....	819,600	866,875	70,000	202,000	100,000	81,000
Detroit	U. S. Steel Corp.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Other Plants	18,000	65,000	.....	.....	.....	40,000	.....	.....	25,000	.....	.....
	Total—All Plants	18,000	65,000	.....	.....	.....	40,000	.....	.....	25,000	.....	.....
St. Louis	U. S. Steel Corp.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	Other Plants	635,000	1,132,800	100,000	340,000	.....	470,800	132,000	90,000	.....	32,000	10,000
	Total—All Plants	635,000	1,132,800	100,000	340,000	.....	470,800	132,000	90,000	.....	32,000	10,000
Southern	U. S. Steel Corp.	1,031,000	672,000	348,600	172,000	33,200	118,200	.....	.....	.....	120,000	115,000
	Other Plants	306,000	381,950	.....	.....	.....	381,950	.....	.....	.....	124,000	90,000
	Total—All Plants	1,337,000	1,053,950	348,600	172,000	33,200	500,150	.....	.....	.....	244,000	205,000
Duluth	U. S. Steel Corp.	540,000	120,000	.....	.....	.....	120,000	.....	.....	.....	100,000	85,000
	Other Plants	.....	3,800	.....	.....	.....	3,800	.....	.....	.....	.....	.....
	Total—All Plants	540,000	123,800	.....	.....	.....	123,800	.....	.....	.....	100,000	85,000
Chicago and West	U. S. Steel Corp.	6,149,500	4,533,800	896,000	916,000	720,000	1,403,600	332,000	266,200	.....	597,000	631,000
	Other Plants	4,256,410	4,034,500	657,000	324,000	160,000	2,422,000	205,500	.....	266,000	370,000	502,000
	Total—All Plants	10,405,910	8,568,300	1,553,000	1,240,000	880,000	3,825,600	537,500	266,200	266,000	967,000	1,133,000
Grand Total—All All Districts	U. S. Steel Corp.	22,729,625	15,339,800	2,963,100	2,541,000	1,783,200	4,264,000	1,080,800	1,030,200	1,677,500	2,338,000	2,251,400
	Other Plants	32,792,360	27,818,015	2,822,500	4,768,420	1,878,800	11,140,550	3,196,275	1,251,500	2,760,000	1,898,200	1,817,400
	Grand Total	55,521,985	43,157,845	5,785,600	7,309,420	3,662,000	15,404,550	4,277,075	2,281,700	4,437,500	4,236,200	4,068,800

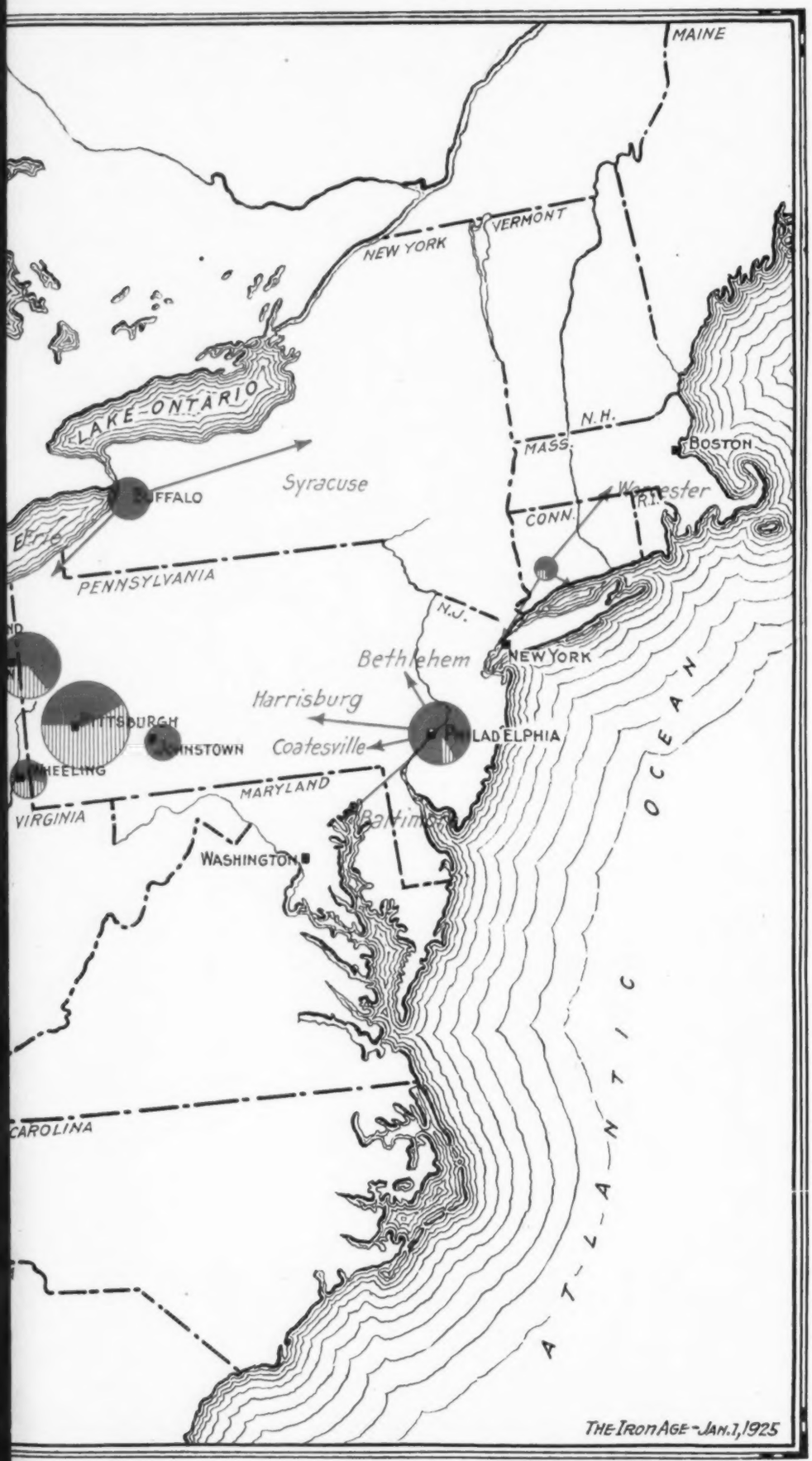
Note.—Does not include ingot capacity of steel foundries nor of plants which make ingots but do not have hot trains of rolls.

Name of Company and Location of Plant	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)								
			Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Inc. Seamless Tubes)	Wire Rods	Plain Wire (Net Tons)
EASTERN DISTRICT											
American Steel & Wire Co., (Central Wks.), Worcester, Mass.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22,400
American Steel & Wire Co., (North Wks.), Worcester, Mass.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	65,000
American Steel & Wire Co., (South Wks.), Worcester, Mass.	179,000	27,000	.....	.....	.....	27,000	.....	.....	.....	138,000	72,000
American Steel & Wire Co., New Haven, Conn.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22,000
Total Steel Corporation Plants—Eastern District.	179,000	27,000	.....	.....	.....	27,000	.....	.....	.....	138,000	181,400
Aetna Nut Co., Southington, Conn.	.....	4,200	.....	.....	.....	4,200	.....	.....	.....	.....	.....
Am. Tube & Stamping Co., Bridgeport, Conn.	85,000	82,000	.....	.....	.....	82,000	.....	.....	.....	.....	.....
Ames (W.) & Co., Jersey City, N. J.	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Bancroft & Martin, R. M. Co., So. Portland, Me.	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Burden Iron Co., Troy, N. Y.	.....	47,000	.....	.....	.....	47,000	.....	.....	.....	.....	.....
Champion Horseshoe Co., Pawtucket, R. I.	.....	6,000	.....	.....	.....	6,000	.....	.....	.....	.....	.....
Chrome Steel Works, Chrome, N. J.	45,000	40,000	.....	6,000	.....	34,000	.....	.....	.....	.....	.....
Coes Wrench Co., Worcester, Mass.	.....	800	.....	.....	.....	800	.....	.....	.....	.....	.....
Cohoes Rolling Mill Co., Cohoes, N. Y.	.....	30,000	.....	.....	.....	.....	.....	.....	30,000	.....	.....
Crucible Steel Co. of Am., Harrison, N. J.	85,800	45,000	.....	.....	.....	45,000	.....	.....	.....	15,000	.....
Crucible Steel Co. of Am., Auburn, N. Y.	.....	300	.....	.....	.....	300	.....	.....	.....	.....	.....
Crucible Steel Co. of Am., Jersey City, N. J.	.....	4,500	.....	.....	.....	4,500	.....	.....	.....	.....	3,600
Collins Co., Collinsville, Conn.	1,200	3,000	.....	.....	.....	3,000	.....	.....	.....	.....	.....
Driver-Harris Co., Harrison, N. J.	400	.....	.....	.....	.....	.....	.....	.....	.....	15,000	.....
Heller Bros. Co., Newark, N. J.	1,200	5,000	.....	.....	.....	5,000	.....	.....	.....	.....	.....
Intr'l High Speed St. Co., Rockaway, N. J.	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Ludlum Steel Co., Watervliet, N. Y.	24,000	16,000	.....	.....	.....	16,000	.....	.....	.....	.....	.....
National Iron Bank, Rahway, N. J.	27,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mass. Iron & Steel Co., Danvers, Mass.	.....	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
Pardee Works (C), Inc., Perth Amboy, N. J.	75,000	65,000	.....	.....	.....	65,000	.....	.....	.....	.....	.....
American Electrical Works, Phillipsdale, R. I.	.....	13,000	.....	.....	.....	13,000	.....	.....	.....	2,000	.....
Phoenix Horseshoe Co., Poughkeepsie, N. Y.	.....	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
Portland Iron & Steel Co., Portland, Me.	12,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rail Joint Co., Troy, N. Y.	.....	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Rockaway Rolling Mills Corp., Rockaway, N. J.	.....	13,000	.....	.....	.....	13,000	.....	.....	.....	.....	.....
Rome Iron Mills, Rome, N. Y.	.....	28,000	.....	.....	.....	28,000	.....	.....	.....	.....	.....
Singer Mfg. Co., Elizabethport, N. J.	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Standard Horseshoe Co., So. Wareham, Mass.	.....	6,000	.....	.....	.....	6,000	.....	.....	.....	.....	.....
Stanley Works, New Britain, Conn.	30,000	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Stanley Works, Bridgewater, Mass.	.....	35,000	.....	.....	.....	35,000	.....	.....	.....	.....	.....
Tremont Nail Co., W. Wareham, Mass.	25,000	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Tuttle, Charles W., Auburn, N. Y.	.....	4,000	.....	.....	.....	4,000	.....	.....	.....	.....	.....
Ulster Iron Works, Dover, N. J.	.....	24,000	.....	.....	.....	24,000	.....	.....	.....	.....	.....
Washburn Wire Co., Phillipsdale, R. I.	38,000	.....	.....	.....	.....	.....	.....	.....	.....	22,800	6,000
Wurster (F. W.) & Co., Brooklyn, N. Y.	.....	6,000	.....	.....	.....	6,000	.....	.....	.....	.....	.....
Grand Total—All Companies—Eastern District.	629,100	710,800	.....	6,000	.....	674,800	.....	.....	30,000	192,800	191,000
VALLEY DISTRICT											
Carnegie Steel Co., Farrell, Pa.	624,000	84,000	.....	84,000	.....	.....	.....	.....	.....	.....	.....
Carnegie Steel Co., New Castle, Pa.	770,000	(Semi-	Finished)								
Carnegie Steel Co., (Ohio Works), Youngstown, O.	1,460,000	(Semi-	Finished)								
Carnegie Steel Co., (McDonald Mills), McDonald, O.	.....	355,600	.....	.....	.....	355,600	.....	.....	.....	.....	.....
Carnegie Steel Co., (Upper Union M.), Youngstown, O.	.....	263,800	.....	.....	.....	263,800	.....	.....	.....	.....	.....
Carnegie Steel Co., (Lower Union), Youngstown, O.	.....	156,000	.....	.....	.....	156,000	.....	.....	.....	.....	.....
Am. Sheet & T. P. Co., (Mercer Works), Farrell, Pa.	.....	43,500	.....	.....	.....	.....	43,500	.....	.....	.....	.....
Am. Sheet & T. P. Co., (Farrell), Farrell, Pa.	.....	111,400	.....	.....	.....	.....	.....	111,400	.....	.....	.....
Am. Sheet & T. P. Co., (N. Castle), New Castle, Pa.	.....	78,400	.....	.....	.....	.....	.....	78,400	.....	.....	.....
Am. Sheet & T. P. Co., (Shenango), New Castle, Pa.	.....	150,800	.....	.....	.....	.....	.....	150,800	.....	.....	.....
Am. Steel & Wire Co., Farrell, Pa.	.....	.....	.....	.....	.....	.....	.....	.....	.....	150,000	112,000
Total U. S. Steel Corp. Plants—Valley District.	2,854,000	1,243,500	.....	84,000	.....	775,400	43,500	340,630	.....	150,000	112,000
Brier Hill Steel Co., Youngstown, O.	648,000	240,000	.....	240,000	.....	.....	.....	.....	.....	.....	.....
Brier Hill Steel Co., (Empire Works), Niles, O.	.....	40,000	.....	.....	.....	.....	40,000	.....	.....	.....	.....
Brier Hill Steel Co., (Thomas), Niles, O.	.....	50,000	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Brier Hill Steel Co., (W. Reserve), Warren, O.	.....	80,000	.....	.....	.....	.....	80,000	.....	.....	.....	.....
Byers Co., (A. M.), Girard, O.	.....	(Semi-	Finished)								
Falcon Steel Co., Niles, O.	.....	60,000	.....	.....	.....	.....	60,000	.....	.....	.....	.....
Mahoning Valley Steel Co., Niles, O.	.....	45,000	.....	.....	.....	.....	45,000	.....	.....	.....	.....
Newton Steel Co., Newton Falls.	.....	50,000	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Republic Iron & Steel Co., Youngstown, O.	1,400,000	682,000	.....	70,000	.....	384,000	.....	.....	228,000	.....	.....
Republic Iron & Steel Co., Niles, O.	.....	110,000	.....	.....	.....	.....	110,000	.....	.....	.....	.....
Sharon Steel Hoop Co., Sharon, Pa.	210,000	180,000	.....	.....	.....	180,000	.....	.....	.....	.....	.....
Sharon Steel Hoop Co., Youngstown, O.	.....	124,000	.....	54,000	.....	.....	70,000	.....	.....	.....	.....
Sharon Steel Hoop Co., Lowellville, O.	300,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Trumbull Steel Co., Warren, O.	450,000	370,000	.....	.....	.....	140,000	100,000	130,000	.....	.....	.....
Warren Iron & Steel Co., Warren, O.	.....	12,000	.....	.....	.....	.....	12,000	.....	.....	.....	.....
Wilkes Rolling Mill Co., Sharon, Pa.	.....	5,000	.....	.....	.....	.....	5,000	.....	.....	.....	.....
Youngstown Sheet & Tube Co., Youngstown, O.	1,520,000	988,400	.....	225,000	.....	225,000	88,400	.....	450,000	149,600	126,000
Grand Total—All Companies—Valley District.	7,382,000	4,279,900	.....	673,000	.....	1,704,400	753,900	470,600	678,000	299,600	238,000
JOHNSTOWN DISTRICT											
Altoona Iron Co., Altoona, Pa.	.....	24,000	.....	.....	.....	24,000	.....	.....	.....	.....	.....
Cambria Steel Co., Johnstown, Pa.	2,016,000	1,197,360	240,000	331,920	184,800	440,640	.....	.....	.....	120,000	95,000
Latrobe Electric Steel Co., Latrobe, Pa.	9,350	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Railway Steel Spring Co., Latrobe, Pa.	92,000	.....	(Tires, e	tc.)							
Vanadium Alloy Steel Co., Latrobe, Pa.	7,500	5,000	.....	.....	.....	5,000	.....	.....	.....	.....	.....
Grand Total—All Companies—Johnstown District.	2,124,850	1,236,360	240,000	331,920	184,800	479,640	.....	.....	.....	120,000	95,000

Name of Company and Location of Plant	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)							Wire Rods	Plain Wire (Net Tons)
			Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Inc. Seamless Tubes)		
PHILADELPHIA DISTRICT											
American Bridge Co., Pencoyd, Pa.	240,000	220,000	.....	.....	190,000	30,000	.....	.....	.....	.....	.....
American Steel & Wire Co., Allentown, Pa.	.....	.....	.....	.....	.....	.....	.....	.....	.....	130,000	140,000
American Steel & Wire Co., Trenton, N. J.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000
Total Steel Corporation Plants—Philadelphia District.	240,000	220,000	.....	.....	190,000	30,000	.....	.....	.....	130,000	170,000
Bordentown St. & Tube Corp., Bordentown, N. J.	.....	2,500	.....	.....	.....	.....	.....	.....	2,500	.....	.....
Alan Wood I. & S. Co., Ivy Rock, Pa.	500,000	125,000	.....	125,000	.....	.....	.....	.....	.....	.....	.....
Alan Wood I. & S. Co., Conshohocken, Pa.	.....	75,000	.....	70,000	.....	.....	5,000	.....	.....	.....	.....
Alan Wood I. & S. Co., Conshohocken, Pa. (J. Wood&Co.)	.....	25,000	.....	25,000	.....	.....	.....	.....	.....	.....	.....
American Car & Foundry Co., Berwick, Pa.	.....	36,000	.....	.....	.....	36,000	.....	.....	.....	.....	.....
American Horseshoe Co., Phillipsburg, N. J.	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Ivins (Ellwood) Tube Works, Philadelphia, Pa.	.....	500	.....	.....	.....	.....	.....	.....	500	.....	.....
Baldwin Locomotive Works, Eddystone, Pa.	.....	9,000	.....	.....	.....	9,000	.....	.....	.....	.....	.....
Bethlehem Steel Corp., Bethlehem, Pa.	1,412,000	1,170,000	250,000	.....	650,000	270,000	.....	.....	.....	.....	.....
Bethlehem Steel Corp., Steelton, Pa.	788,000	545,000	420,000	.....	.....	125,000	.....	.....	.....	.....	.....
Bethlehem Steel Corp., Sparrows Point, Md.	850,000	685,000	350,000	200,000	.....	.....	60,000	75,000	.....	.....	.....
Bethlehem Steel Corp., Lebanon, Pa.	.....	112,000	.....	.....	.....	112,000	.....	.....	.....	.....	.....
Bethlehem Steel Corp., Reading, Pa.	.....	37,000	.....	.....	.....	37,000	.....	.....	.....	.....	.....
Blandon Rolling Mill, Inc., Blandon, Pa.	.....	.....	(All Semi-Finished)								
Carpenter Steel Co., Reading, Pa.	47,320	21,660	.....	.....	.....	21,660	.....	.....	.....	6,000	6,000
Central Iron & Steel Co., Harrisburg, Pa.	180,000	160,000	.....	160,000	.....	.....	.....	.....	.....	.....	.....
Danville Struct. Tubing Co., Danville, Pa.	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Davis Bros. R. M. & Spike Works, Philadelphia, Pa.	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
D. L. & W. R.R., Scranton, Pa.	.....	800	.....	.....	.....	800	.....	.....	.....	.....	.....
Delaware Seamless Tube Co., Auburn, Pa.	.....	5,000	.....	.....	.....	.....	.....	.....	5,000	.....	.....
Disston (Henry) & Sons, Inc., Philadelphia, Pa.	24,000	35,000	.....	5,000	.....	20,000	10,000	.....	.....	.....	.....
Drain Steel Co., Moore, Pa.	75,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
East End Puddle Mill, Milton, Pa.	.....	.....	(Semi-Finished)								
Eastern Rolling Mill Co., Baltimore, Md.	.....	60,000	.....	.....	.....	.....	60,000	.....	.....	.....	.....
Eastern Steel Co., Pottsville, Pa.	200,000	180,000	.....	.....	150,000	30,000	.....	.....	.....	.....	.....
Eddystone Steel Co., Crum Lynne, Pa.	10,000	30,000	.....	20,000	.....	10,000	.....	.....	.....	.....	.....
Edwards, E. T., Columbia, Pa.	.....	27,000	.....	.....	.....	27,000	.....	.....	.....	.....	.....
Glasgow Iron Co., Pottstown, Pa.	.....	147,000	.....	147,000	.....	.....	.....	.....	.....	.....	.....
Harrisburg Pipe & P. Bdg. Co., Harrisburg, Pa.	80,000	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Harrisburg P. & P. B. Co. (H. Bar M.) Harrisburg, Pa.	.....	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
Hess Steel Corp., Baltimore, Md.	30,000	22,000	.....	.....	.....	22,000	.....	.....	.....	.....	.....
Hoopes & Townsend Co., Ft. Washington, Pa.	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Hughes & Patterson, Philadelphia, Pa.	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Illingworth (John) Steel Co., Frankford, Pa.	1,500	25,000	.....	.....	.....	23,400	1,600	.....	.....	.....	.....
Janson Steel & Iron Co., Columbia, Pa.	.....	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
Lalance & Grosjean Mfg. Co., Harrisburg, Pa.	.....	18,000	.....	.....	.....	.....	.....	18,000	.....	.....	.....
Lebanon Iron Co., Duncannon, Pa.	.....	35,000	.....	.....	.....	35,000	.....	.....	.....	.....	.....
Lebanon Iron Co., Lebanon, Pa.	.....	100,000	.....	.....	.....	100,000	.....	.....	.....	.....	.....
Logan Iron & Steel Co., Burnham, Pa.	.....	45,000	.....	.....	.....	45,000	.....	.....	.....	.....	.....
Lukens Steel Co., Coatsville, Pa.	651,840	428,500	.....	428,500	.....	.....	.....	.....	.....	.....	.....
Van Alen & Co., Northumberland, Pa.	.....	4,500	.....	.....	.....	4,500	.....	.....	.....	.....	.....
Mfrs. Iron & Steel Co., Catasaqua, Pa.	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Midvale Steel & Ordnance Co., Nicetown, (Phila.), Pa.	207,200	25,000	.....	.....	.....	25,000	.....	.....	.....	.....	.....
Midvale Steel & Ordnance Co., Wilmington, Del.	144,000	.....	(Semi-Finished)								
Midvale Steel & Ordnance Co., Coatesville, Pa.	550,000	335,000	.....	310,000	.....	.....	.....	.....	25,000	.....	.....
Milton Mfg. Co., Milton, Pa.	19,800	76,000	.....	.....	.....	76,000	.....	.....	.....	.....	.....
Nagle Steel Co., Pottstown, Pa.	.....	20,000	.....	20,000	.....	.....	.....	.....	.....	.....	.....
Nagle Steel Co., Seyfert Station, Pa.	.....	20,000	.....	20,000	.....	.....	.....	.....	.....	.....	.....
National Lock Washer Co., Riverside, N. J.	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
National Steel Rolling Co., Schuylkill Haven, Pa.	.....	25,000	.....	.....	.....	25,000	.....	.....	.....	.....	.....
Nicetown Plate Washer Co., Inc., Philadelphia, Pa.	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Parkesburg Iron Co., Parkesburg, Pa.	.....	15,000	.....	.....	.....	.....	.....	.....	15,000	.....	.....
Penn-Seaboard Steel Corp., New Castle, Del.	90,000	.....	(Semi-Finished)								
Superior Pipe Co., Columbia, Pa.	.....	70,000	.....	.....	.....	.....	.....	.....	70,000	.....	.....
Penna. Brake Beam Co., Danville, Pa.	.....	15,000	7,500	.....	7,500	.....	.....	.....	.....	.....	.....
Phoenix Iron Co., Phoenixville, Pa.	225,000	200,000	.....	.....	180,000	20,000	.....	.....	.....	.....	.....
Pine Iron Works Co., Pine Forge, Pa.	.....	20,000	.....	20,000	.....	.....	.....	.....	.....	.....	.....
Pine Iron Works Co., Williamsport, Pa.	36,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Penna. Forge Co., Philadelphia, Pa.	7,200	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
Reading Iron Co., Reading, Pa.	.....	240,000	.....	.....	.....	.....	.....	.....	240,000	.....	.....
Reading Iron Co., Pottstown-Birdsboro, Pa.	.....	22,500	.....	.....	.....	22,500	Nail Plate	.....	.....	.....	.....
Reading Iron Co., Danville, Pa.	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
South Chester Tube Co., Chester, Pa.	.....	70,000	.....	.....	.....	.....	.....	.....	70,000	.....	.....
Roebling's (Jno. A.) Sons Co., Trenton & Kinkora, N. J.	150,000	.....	.....	.....	.....	.....	.....	.....	.....	155,000	150,000
Scranton Bolt & Nut Co., Scranton, Pa.	.....	40,000	6,000	.....	.....	34,000	.....	.....	.....	.....	.....
Slat'g. I. & S. Co. (Foley Sh. Co.), Slatington, Pa.	.....	6,500	.....	.....	.....	6,500	.....	.....	.....	.....	.....
Standard Steel Works Co., Burnham, Pa.	145,200	.....	(Tires, etc.)								
Sweets Steel Co., Williamsport, Pa.	.....	100,000	60,000	.....	.....	40,000	.....	.....	.....	.....	.....
Tacony Steel Co., Philadelphia, Pa.	40,000	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Worth Steel Co., Claymont, Del.	200,000	250,000	.....	250,000	.....	.....	.....	.....	.....	.....	.....
Wyoming Shovel Works, Wyoming, Pa.	.....	6,000	.....	.....	.....	.....	6,000	.....	.....	.....	.....
Grand Total—All Companies—Philadelphia District.	6,904,060	6,229,460	1,093,500	1,800,500	1,177,500	1,494,360	142,600	93,000	428,000	291,000	326,000
BUFFALO DISTRICT											
National Tube Co., Syracuse, N. Y.	.....	23,000	.....	.....	.....	.....	.....	.....	23,000	.....	.....
Atlas Steel Corp., Dunkirk, N. Y.	35,050	19,000	.....	.....	.....	19,000	.....	.....	.....	.....	.....
Buffalo Bolt Co., No. Tonawanda, N. Y.	.....	25,000	.....	.....	.....	25,000	.....	.....	.....	.....	7,300
Buffalo Steel Co., Tonawanda, N. Y.	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Crucible Steel Co. of Am., Syracuse, N. Y.	20,400	8,000	.....	.....	.....	6,000	2,000	.....	.....	.....	1,800
Cyclops Steel Co., Titusville, Pa.	5,750	5,000	.....	.....	.....	5,000	.....	.....	.....	.....	.....
Donner Steel Co., Buffalo, N. Y.	540,000	300,000	.....	100,000	.....	200,000	.....	.....	.....	.....	2,500
Eckels-Nye Steel Co., Syracuse, N. Y.	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Halcomb Steel Co., Syracuse, N. Y.	39,000	19,000	.....	.....	.....	17,000	2,000	.....	.....	6,000	.....
Chemung Valley Steel Co., Elmira Heights, N. Y.	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Lackawanna Steel Co., Lackawanna, N. Y. (Owned by Beth. Steel Corp'n)	1,840,000	1,161,000	500,000	140,000	140,000	381,000	.....	.....	.....	.....	.....
McInnes Steel Co., Corry, Pa.	200	150	.....	.....	.....	150	.....	.....	.....	.....	.....
New York Central R.R. Co., E. Buffalo, N. Y.	.....	2,150	.....	.....	.....	2,150	.....	.....	.....	.....	.....
Onondaga Steel Co., E. Syracuse, N. Y.	1,300	1,000	.....	.....	.....	1,000	.....	.....	.....	.....	.....
Iroquois Steel Co., Inc., Fulton, N. Y.	7,500	5,000	.....	.....	.....	5,000	.....	.....	.....	.....	.....
Seneca Iron & Steel Co., Blasdell, N. Y.	.....	70,000	.....	.....	.....	.....	70,000	.....	.....	.....	.....
Simonds Saw & Steel Co., Lockport, N. Y.	17,100	13,000	.....	.....	.....	7,000	6,000	.....	.....	.....	.....
Sizer Steel Corp., Buffalo and Solvay, N. Y.	45,600	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
U. S. Horseshoe Co., Erie, Pa.	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Wayne Steel Co., Erie, Pa.	30,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Westerman & Co., Inc., Lockport, N. Y.	.....	9,000	.....	.....	.....	9,000	.....	.....	.....	.....	.....
Wickwire Bros., Inc., Cortland, N. Y.	35,000	.....	.....	.....	.....	.....	.....	.....	.....	36,000	25,000
Wickwire Spencer Steel Corp., Buffalo, N. Y.	144,000	.....	.....	.....	.....	.....	.....	.....	.....	120,000	60,000
Grand Total—All Companies—Buffalo District.	2,760,900	1,754,300	500,000	240,000	140,000	771,300	80,000	.....	23,000	162,000	96,800

Name of Company and Location of Plant	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)							Wire Rods	Plain Wire (Net Tons)
			Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Inc. Seamless Tubes)		
PITTSBURGH DISTRICT											
Carnegie Steel Co., Clairton, Pa	672,000	504,000	.....	.....	264,000	240,000	.....	.....	.....	.....	.....
Carnegie Steel Co., (Clarks Wks.), Pittsburgh, Pa	.....	95,500	.....	.....	.....	95,500	.....	.....	.....	.....	.....
Carnegie Steel Co., Duquesne, Pa	1,390,000	823,800	.....	.....	.....	823,800	.....	.....	.....	.....	.....
Carnegie Steel Co. (Edg. Thomson), Braddock, Pa	1,462,400	1,510,000	1,510,000	.....	.....	.....	.....	.....	.....	.....	.....
Carnegie Steel Co. (Homestead), Munhall, Pa	2,417,000	1,701,000	.....	1,229,000	448,000	24,000	.....	.....	.....	.....	.....
Carnegie Steel Co. (McCutcheon), Pittsburgh, Pa	.....	117,300	1,500	.....	.....	115,800	.....	.....	.....	.....	.....
Carnegie Steel Co., Monessen, Pa	.....	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Carnegie Steel Co., (Painter), Pittsburgh, Pa	.....	65,000	.....	.....	.....	65,000	.....	.....	.....	.....	.....
Carnegie Steel Co., (Up-Union), Pittsburgh, Pa	.....	267,700	.....	92,000	128,000	47,700	.....	.....	.....	.....	.....
Carnegie Steel Co., (Low. Union), Pittsburgh, Pa	.....	128,000	.....	48,000	.....	80,000	.....	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., Hyde Park, Pa	.....	24,000	.....	.....	.....	.....	24,000	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., Leechburg, Pa	.....	49,300	.....	.....	.....	.....	49,300	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., (Old Meadow), Scottdale, Pa	.....	39,700	.....	.....	.....	.....	39,700	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., Scottdale, Pa	.....	45,000	.....	.....	.....	.....	45,000	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., Vandergrift, Pa	309,000	192,600	.....	.....	.....	.....	192,600	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., (Wood Wks.), McKeesport	.....	69,200	.....	.....	.....	.....	69,200	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., (National), Monessen, Pa	.....	94,000	.....	.....	.....	.....	.....	94,000	.....	.....	.....
Am. Sheet & Tin Plate Co., (Penna.), New Kensington, Pa	.....	32,600	.....	.....	.....	.....	.....	32,600	.....	.....	.....
Am. Sheet & Tin Plate Co., (Pgh. Works), New Kensington, Pa	.....	30,100	.....	.....	.....	.....	.....	30,100	.....	.....	.....
Am. Sheet & Tin Plate Co., Morgantown, W Va	.....	42,400	.....	.....	.....	.....	.....	42,400	.....	.....	.....
Am. Steel & Wire Co., Braddock, Pa	.....	.....	.....	.....	.....	.....	.....	.....	.....	100,000	100,000
Am. Steel & Wire Co., Donora, Pa	649,275	.....	.....	.....	.....	.....	.....	.....	.....	355,000	224,000
Am. Steel & Wire Co., Rankin, Pa	.....	.....	.....	.....	.....	.....	.....	.....	.....	140,000	150,000
Am. Steel & Wire Co., (Shoenberger), Pittsburgh, Pa	413,700	30,000	.....	.....	.....	30,000	.....	.....	.....	.....	.....
National Tube Co., (Cont'l), Pittsburgh, Pa	.....	92,000	.....	.....	.....	.....	.....	.....	92,000	.....	.....
National Tube Co., (Nat. & Chr. Park), McKeesport, Pa	660,000	460,500	.....	.....	.....	.....	.....	.....	460,500	.....	.....
National Tube Co., (Penna), Pittsburgh, Pa	.....	290,000	.....	.....	.....	.....	.....	.....	290,000	.....	.....
Shelby Steel Tube Co., Ellwood City, Pa	.....	145,000	.....	.....	.....	.....	.....	.....	145,000	Seamless	.....
Total U. S. Steel Corp. Plants—Pittsburgh District	7,973,375	6,908,700	1,511,500	1,369,000	840,000	1,581,800	419,800	199,100	987,500	595,000	474,000
Allegheny Steel Co., Brackenridge, Pa	240,000	183,000	.....	.....	.....	.....	171,000	.....	12,000	.....	.....
American Steel Co., Waynesburg, Pa	.....	12,000	.....	.....	.....	.....	.....	12,000	.....	.....	50,000
American Steel Co., Ellwood City, Pa	.....	.....	.....	.....	.....	.....	108,000	.....	.....	.....	.....
Apollo Steel Co., Apollo, Pa	40,000	108,000	.....	.....	.....	8,000	.....	.....	.....	.....	.....
Braeburn Steel Co., Braeburn, Pa	20,000	8,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Brown & Co., Inc., Pittsburgh, Pa	.....	15,000	.....	.....	.....	.....	.....	.....	90,000	.....	.....
Byers Co., (A.M.), Pittsburgh, Pa	.....	90,000	.....	.....	.....	50,000	20,000	.....	.....	3,800	.....
Carbon Steel Co., Pittsburgh, Pa	123,600	140,000	.....	70,000	.....	15,200	.....	.....	.....	.....	.....
Colonial Steel Co., Colona, Pa	62,000	27,200	.....	12,000	.....	1,700	.....	.....	.....	6,000	6,000
Baltimore & Ohio R.R., Cumberland, Md	.....	1,700	.....	.....	.....	.....	.....	.....	.....	.....	.....
Copper Clad Steel Co., Rankin, Pa	.....	.....	.....	.....	.....	120,000	30,000	.....	.....	.....	.....
Crucible Steel Co. of Am., (Park), Pittsburgh, Pa	141,000	150,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Crucible Steel Co. of Am., (Crescent Wks.), Pittsburgh, Pa	56,940	10,000	.....	.....	.....	16,500	16,500	.....	.....	.....	.....
Crucible Steel Co. of Am., (LaBelle Wks.), Pittsburgh, Pa	27,610	33,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crucible Steel Co. of Am., (Singer-Nimick), Pittsburgh, Pa	7,000	25,000	.....	.....	.....	14,000	11,000	.....	.....	.....	.....
Central Tube Co., Economy, Pa	.....	60,000	.....	.....	.....	.....	.....	.....	60,000	.....	.....
Dilworth-Porter & Co., Pittsburgh, Pa	.....	121,200	.....	.....	.....	121,200	.....	.....	.....	.....	.....
Anchor Iron & Steel Co., Hayes Station, Pa	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Edgewater Steel Co., Oakmont, Pa	85,000	(Wheels and Tires)									
Atlas Steel Corp., Charleroi	10,040	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Firth-Sterling Steel Co., McKeesport, Pa	9,900	6,000	.....	.....	.....	6,000	.....	.....	.....	.....	.....
Edwards Mfg. Co., Canonsburg, Pa	.....	38,000	.....	.....	.....	.....	26,000	12,000	.....	.....	.....
Forged Steel Wheel Co., Butler, Pa	360,000	171,500	.....	10,000	21,500	140,000	.....	.....	.....	.....	.....
Franklin Steel Co., Franklin, Pa	.....	75,000	.....	.....	.....	75,000	.....	.....	.....	.....	.....
Charcoal Iron Products Co., Washington, Pa	.....	6,000	.....	.....	.....	.....	3,500	2,500	.....	.....	.....
Jessop Steel Co., Washington, Pa	9,600	10,000	.....	.....	.....	.....	10,000	.....	.....	.....	.....
Jones & Laughlin Steel Co., Pittsburgh, Pa	1,740,000	1,555,000	36,000	474,000	385,000	660,000	.....	130,000	215,000	255,000	200,000
Jones & Laughlin Steel Co., Aliquippa, Pa	900,000	345,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Kittanning Iron & Steel Co., Kittanning, Pa	.....	(Semi-Finished)									
Le Moyne Steel Co., Monongahela, Pa	1,600	1,000	.....	.....	.....	1,000	.....	.....	.....	.....	.....
Lockhart Iron & Steel Co., McKees Rocks, Pa	.....	70,000	.....	.....	.....	70,000	.....	.....	.....	.....	.....
McConway & Torley Co., Pittsburgh, Pa	100,000	100,000	.....	.....	.....	100,000	.....	.....	.....	.....	.....
McKeesport Tinplate Co., Portvue, Pa	.....	180,000	.....	.....	.....	.....	.....	180,000	.....	.....	.....
Moorhead Bros. & Co., Inc., Sharpsburg, Pa	.....	100,000	.....	50,000	.....	50,000	.....	.....	.....	.....	.....
Oliver Iron & Steel Co., Pittsburgh, Pa	.....	100,000	.....	.....	.....	100,000	.....	.....	.....	.....	.....
Page Steel & Wire Co., Monessen, Pa	65,000	.....	.....	.....	.....	.....	.....	.....	.....	60,000	60,000
Pittsburgh Crucible Steel Co., Midland, Pa	600,000	150,000	.....	.....	.....	150,000	.....	.....	.....	.....	.....
Penn Iron & Steel Co., Creighton, Pa	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Pittsburgh Forge & Iron Co., Pittsburgh, Pa	.....	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
Pittsburgh Seamless Tube Co., Beaver Falls, Pa	.....	40,000	.....	.....	.....	.....	.....	.....	40,000	.....	.....
Pittsburgh Steel Co., Monessen, Pa	546,000	.....	.....	.....	.....	.....	.....	.....	.....	300,000	335,000
Pittsburgh Steel Co., Glassport, Pa	.....	36,000	.....	.....	.....	36,000	.....	.....	.....	.....	.....
Pittsburgh Steel Products Co., Monessen, Pa	.....	120,000	.....	.....	.....	.....	.....	.....	120,000	.....	.....
Russell Shovel Co., Pittsburgh, Pa	.....	1,700	.....	.....	.....	1,700	.....	.....	.....	.....	.....
Sligo I. & S. Co., (Lockhart I. & S. Co.), Connellsville, Pa	.....	64,000	.....	.....	.....	40,000	24,000	.....	.....	.....	.....
Monongahela Tube Co., Wilson, Pa	.....	25,000	.....	.....	.....	.....	.....	.....	25,000	.....	.....
Spang-Chalfant & Co., Etna, Pa	.....	231,000	.....	.....	.....	.....	.....	.....	231,000	.....	.....
Standard Seamless Tube Co., Economy, Pa	.....	18,000	.....	.....	.....	.....	.....	.....	18,000	.....	.....
Standard Tin Plate Co., Canonsburg, Pa	.....	87,500	.....	.....	.....	.....	.....	87,500	.....	.....	.....
Superior Steel Corp., Carnegie, Pa	.....	120,000	.....	.....	.....	120,000	.....	.....	.....	.....	.....
Taylor (N. & G.) Co., Cumberland, Md	36,000	17,000	.....	.....	.....	.....	.....	17,000	.....	.....	.....
Tyler Tube & Pipe Co., Washington, Pa	.....	29,000	.....	.....	.....	5,000	.....	.....	24,000	.....	.....
United States Rail Co., Cumberland, Md	.....	60,000	60,000	(Rerolled Light)		.....	.....	.....	.....	.....	.....
Universal Steel Co., Bridgeville, Pa	20,000	40,000	.....	.....	.....	.....	40,000	.....	.....	.....	.....
Vulcan Crucible Steel Co., Aliquippa, Pa	9,550	8,000	.....	.....	.....	8,000	.....	.....	.....	.....	.....
Washington Tinplate Co., Washington, Pa	.....	24,000	.....	.....	.....	.....	.....	24,000	.....	.....	.....
West Leechburg Steel Co., W. Leechburg, Pa	.....	53,500	.....	.....	.....	53,500	.....	.....	.....	.....	.....
West Penn Steel Co., Brackenridge, Pa	160,000	50,000	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Witherow Steel Co., Neville Island, Pa	.....	75,000	.....	.....	.....	75,000	.....	.....	.....	.....	.....
Witherow Steel Co., Connellsville, Pa	7,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Total—All Companies—Pittsburgh District	13,351,715	11,962,000	1,607,500	1,985,000	1,246,500	3,706,600	929,800	661,100	1,822,500	1,219,800	1,125,000

THE plants of the country making steel ingots were grouped in 14 districts in the Pittsburgh basing case of the Federal Trade Commission. The red circles show their location and the red arrows and accompanying names of cities in red are to indicate where scattered plants belong in the districting scheme. The areas of the circles are proportional to the ingot capacity of the districts, as given in the tables accompanying this map, and the tinted portion, if any, of each circle shows how much of each d the United States Steel Corporation. The area f the ingot capacity of that district, excluding pl Pacific Coast, which are indicated by the red ar the end of 1922, Detroit's capacity was too small six central districts have 58 per cent of the cou



any, of each circle shows how much of each district's capacity is owned by United States Steel Corporation. The area for Chicago is proportional to ingot capacity of that district, excluding plants in Colorado and on the cific Coast, which are indicated by the red arrows. For the time covered, end of 1922, Detroit's capacity was too small to show proportionally. The central districts have 58 per cent of the country's ingot capacity.

Name of Company and Location of Plant	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)							Wire Rods	Plain Wire (Net Tons)
			Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Inc. Seamless Tubes)		
WHEELING DISTRICT											
Carnegie Steel Co., Bellaire, Ohio	420,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carnegie Steel Co., Mingo Junction, Ohio	600,000	65,000	.....	.....	.....	65,000	.....	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., Dover, Ohio	.....	57,200	.....	.....	.....	.....	57,200	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., (Aetna Stan), Bridgeport, O	.....	45,800	.....	.....	.....	.....	45,800	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., (Guernsey), Cambridge, O.	.....	53,700	.....	.....	.....	.....	53,700	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., New Philadelphia, O	.....	78,800	.....	.....	.....	.....	78,800	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., Wellsville, O	.....	50,000	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Am. Sheet & Tin Plate Co., (Cambridge) Cambridge, O.	.....	34,600	.....	.....	.....	.....	.....	34,600	.....	.....	.....
Am. Sheet & Tin Plate Co., Chester, W. Va	.....	35,200	.....	.....	.....	.....	.....	35,200	.....	.....	.....
Am. Sheet & Tin Plate Co., (LaBelle), Wheeling, W. Va.	.....	38,400	.....	.....	.....	.....	.....	38,400	.....	.....	.....
Am. Sheet & Tin Plate Co., (Laughlin), Martins Ferry, O	.....	89,200	.....	.....	.....	.....	.....	89,200	.....	.....	.....
National Tube Co., Benwood, W. Va	227,750	157,000	.....	.....	.....	.....	.....	.....	157,000	.....	.....
Total U. S. Steel Corp. Plants—Wheeling District	1,247,750	704,900	.....	.....	.....	65,000	285,500	197,400	157,000	.....	.....
Cambridge Steel Co., Cambridge, O	.....	48,000	.....	.....	.....	48,000	.....	.....	.....	.....	.....
Follansbee Bros., Follansbee, W. Va	84,000	56,000	.....	.....	.....	.....	37,000	19,000	.....	.....	.....
Follansbee Bros., Toronto, O	84,000	62,000	.....	.....	.....	.....	62,000	.....	.....	.....	.....
Hudson Sheet & Tin Plate Co., Marietta, O	.....	25,000	.....	.....	.....	.....	.....	25,000	.....	.....	.....
Monongahela Iron & Steel Co., Paden City, W. Va	.....	6,000	.....	.....	.....	.....	6,000	.....	.....	.....	.....
Parkersburg Iron & Steel Co., Parkersburg, W. Va	.....	25,000	.....	.....	.....	.....	25,000	.....	.....	.....	.....
Pittsburgh Tin Plate & Steel Corp., Marietta, O	.....	12,000	.....	.....	.....	.....	.....	12,000	.....	.....	.....
Reeves Mfg. Co., Dover, O	.....	41,000	.....	.....	.....	.....	41,000	.....	.....	.....	.....
Weirton Steel Co., Weirton, W. Va	500,000	235,000	.....	.....	.....	120,000	.....	115,000	.....	.....	.....
Weirton Steel Co., Clarksburg, W. Va	.....	55,000	.....	.....	.....	.....	.....	55,000	.....	.....	.....
Weirton Steel Co., Steubenville, O	.....	55,000	.....	.....	.....	.....	.....	55,000	.....	.....	.....
*LaBelle Iron Works, Steubenville, Ohio	450,000	300,000	.....	130,000	.....	.....	60,000	.....	110,000	.....	.....
*La Belle Iron Works, Wheeling, W. Va	.....	(Semi-	Finished)								
*Wheeling Steel & Iron Co., Benwood, W. Va	225,000	150,000	.....	.....	.....	.....	.....	.....	150,000	.....	.....
*Wheeling Steel & Iron Co., (Belmont Wks.), Wheeling, W. Va	.....	(Semi-	Finished)								
*Wheeling Steel & Iron Co., Yorkville, O	.....	100,000	.....	.....	.....	.....	.....	100,000	.....	.....	.....
*Whitaker-Glessner Co., Martin's Ferry, O	.....	30,000	.....	.....	.....	.....	30,000	.....	.....	.....	.....
*Whitaker-Glessner Co., (Whitaker Wks.), Wheeling, W. Va	.....	54,900	.....	.....	.....	.....	32,400	22,500	.....	.....	.....
*Whitaker-Glessner Co., Beech Bottom, W. Va. (Owned by Wheeling Steel Corp.)	.....	45,000	.....	.....	.....	.....	45,000	.....	.....	.....	.....
Grand Total—All Companies—Wheeling District	2,590,750	2,004,800	.....	130,000	.....	233,000	623,900	600,900	417,000	.....	.....
CLEVELAND DISTRICT											
Am. Sheet & T. P. Co., (Crescent), Cleveland, O	.....	26,900	.....	.....	.....	.....	.....	26,900	.....	.....	.....
Am. Steel & Wire Co., (American), Cleveland, O	.....	.....	.....	.....	.....	.....	.....	.....	.....	140,000	72,000
Am. Steel & Wire Co., (Consolidated), Cleveland, O	.....	.....	.....	.....	.....	.....	.....	.....	.....	120,000	95,000
Am. Steel & Wire Co., (Cuyahoga), Cleveland, O	.....	127,000	.....	.....	.....	127,000	.....	.....	.....	100,000	110,000
Am. Steel & Wire Co., (H. P.), Cleveland, O	.....	7,000	.....	.....	.....	7,000	.....	.....	.....	28,000	67,000
Am. Steel & Wire Co., (Newburgh), Cleveland, O	970,000	.....	.....	.....	.....	.....	.....	.....	.....	120,000	112,000
Am. Steel & Wire Co., (Salem), Salem, O	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27,000
National Tube Co., Lorain, O	1,345,000	726,000	207,000	.....	.....	9,000	.....	.....	510,000	.....	.....
Total—U. S. Steel Corp. Plants—Cleveland District	2,315,000	886,900	207,000	.....	.....	143,000	.....	26,900	510,000	508,000	483,000
Ashtabula Steel Co., Ashtabula, O	.....	35,000	.....	.....	.....	.....	35,000	.....	.....	.....	.....
American Steel & Tube Co., Lorain, O	.....	22,500	.....	.....	.....	15,000	7,500	.....	.....	.....	.....
Cleveland Hardware Co., Cleveland, O	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Cleveland Steel Co., Cleveland, O	.....	60,000	.....	60,000	.....	.....	.....	.....	.....	.....	.....
Midland Seamless T. & S. Co., Lorain, O	180,000	(Semi-	Finished)								
Crucible Steel Co. of America, Norwalk, O	14,000	18,000	.....	8,000	.....	10,000	.....	.....	.....	.....	.....
Hunter Crucible Steel Co., Cleveland, O	8,700	7,500	.....	.....	.....	7,500	.....	.....	.....	.....	.....
Elyria Iron & Steel Co., Elyria, O	.....	50,000	.....	.....	.....	50,000	.....	.....	.....	.....	.....
Empire Rolling Mill Co., Cleveland, O	.....	70,000	.....	.....	.....	40,000	30,000	.....	.....	.....	.....
Falls Hollow Staybolt Co., Cuyahoga Falls, O	.....	3,000	.....	.....	.....	3,000	.....	.....	.....	.....	.....
Lake Erie Bolt & Nut Co., Cleveland, O	.....	50,000	.....	.....	.....	50,000	.....	.....	.....	.....	.....
McKinney Steel Co., Cleveland, O	800,000	(Semi-	Finished)								
Bourne-Fuller Co., (U. R. & Co.), Cleveland, O	.....	110,000	.....	.....	.....	110,000	.....	.....	.....	.....	.....
Ohio Seamless Tube Co., Shelby, O	.....	36,000	.....	.....	.....	.....	.....	.....	36,000	.....	.....
Otis Steel Co., Cleveland, O	103,000	386,000	.....	248,000	.....	.....	138,000	.....	.....	.....	.....
Bourne-Fuller Co., (Upson Works), Cleveland, O	240,000	120,000	.....	.....	.....	120,000	.....	.....	.....	.....	.....
Grand Total—All Companies—Cleveland District	3,660,700	1,866,900	207,000	316,000	.....	560,500	210,500	26,900	546,000	508,000	483,000
ST. LOUIS DISTRICT											
American Car & Foundry Co., St. Louis, Mo	.....	59,000	.....	.....	.....	59,000	.....	.....	.....	.....	.....
Am. McKenna Process Co., Kansas City, Kan	.....	100,000	100,000	.....	.....	.....	.....	.....	.....	.....	.....
Black Steel & Wire Co., Kansas City, Mo	15,000	.....	.....	.....	.....	.....	.....	.....	.....	32,000	10,000
Missouri Rolling Mill Corp., St. Louis, Mo	.....	30,000	.....	.....	.....	30,000	.....	.....	.....	.....	.....
Kansas City Bolt & Nut Co., Kansas City, Mo	50,000	115,000	.....	.....	.....	115,000	.....	.....	.....	.....	.....
K. C. Southern Ry. Co., Kansas City, Mo	.....	1,800	.....	.....	.....	1,800	.....	.....	.....	.....	.....
Laclede Steel Co., Madison, Ill	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Laclede Steel Co., Alton, Ill	100,000	80,000	.....	.....	.....	80,000	.....	.....	.....	.....	.....
National Enameling & S. Co., Granite City, Ill	350,000	538,000	.....	340,000	.....	.....	108,000	90,000	.....	.....	.....
National Enameling & S. Co., St. Louis, Mo	.....	24,000	.....	.....	.....	.....	24,000	.....	.....	.....	.....
National Rolling Mill Co., Vincennes, Ind	.....	20,000	.....	.....	.....	20,000	.....	.....	.....	.....	.....
St. Louis Screw Co., St. Louis, Mo	.....	45,000	.....	.....	.....	45,000	.....	.....	.....	.....	.....
Scullin Steel Co., St. Louis, Mo	120,000	80,000	.....	.....	.....	80,000	.....	.....	.....	.....	.....
Total—All Companies—St. Louis District	635,000	1,132,800	100,000	340,000	.....	470,800	132,000	90,000	.....	32,000	10,000

Name of Company and Location of Plant	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)							Wire Rods	Plain Wire (Net Tons)
			Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Incl. Seamless Tubes)		
COLUMBUS DISTRICT											
Carnegie Steel Co., Columbus, O	200,000	(Semi-	Finished)								
American Rolling Mill Co., Middletown, O	300,000	100,000	.....	.....	.....	.....	100,000	.....	.....	.....	.....
Am. Rolling Mill, (Central Works,), Middletown, O	105,000	20,000	.....	.....	.....	.....	20,000	.....	.....	.....	.....
American Rolling Mill Co., Zanesville, O	.....	65,000	.....	.....	.....	.....	65,000	.....	.....	.....	.....
American Rolling Mill Co., (A.I. & M.Co.), Ashland, Ky	330,000	25,000	.....	.....	.....	.....	25,000	.....	.....	.....	.....
Andrews Steel Co., Newport, Ky	300,000	(Semi-	Finished)								
Ashland Steel Co., Ashland, Ky	190,000	.....	.....	.....	.....	.....	.....	.....	.....	100,000	.....
Becker Steel Co., Charleston, W. Va	1,000	6,000	.....	.....	.....	6,000	.....	.....	.....	.....	.....
Belfont Iron Works, Ironton, O	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21,000
United Alloy Steel Corp., Canton, (Inc. Berger), O	686,000	553,000	.....	.....	.....	400,000	153,000	.....	.....	.....	.....
United Alloy Steel Corp., (So. Works), Canton, O	180,000	50,000	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Buckeye Roll. Mill Co., Newark, O	.....	36,000	36,000	.....	.....	.....	.....	.....	.....	.....	.....
Central Steel Co., Massillon, O	300,000	240,000	.....	.....	.....	240,000	.....	.....	.....	.....	.....
Central Steel Co., (Mass. R. M. Co.), Massillon, O	.....	70,000	.....	.....	.....	.....	70,000	.....	.....	.....	.....
Weldless Tube Co., Wooster, O	.....	12,000	.....	.....	.....	.....	.....	.....	12,000	.....	.....
Cincinnati Horseshoe & Iron Co., Cleves, O	.....	9,600	.....	.....	.....	9,600	.....	.....	.....	.....	.....
Falcon Tin Plate Co., Canton, O	.....	40,000	.....	.....	.....	.....	.....	40,000	.....	.....	.....
Kelly Nail & Iron Co., Ironton, O	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30,000
Mansfield Sheet & T. P. Co., Mansfield, O	150,000	82,000	.....	.....	.....	.....	52,000	30,000	.....	.....	.....
National Pressed Steel Co., Massillon, O	.....	150,000	.....	75,000	.....	75,000	.....	.....	.....	.....	.....
Newport Rolling Mill Co., Newport, Ky (Owned by Andrews Steel Co.)	.....	110,075	.....	.....	.....	.....	110,075	.....	.....	.....	.....
Norton Iron Works, Ashland, Ky	.....	8,000	.....	.....	.....	8,000	.....	.....	.....	.....	30,000
Pollak Steel Co., Marion, O	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Peerless Drawn Steel Co., Massillon, O	.....	33,000	.....	.....	.....	33,000	.....	.....	.....	.....	.....
Steel & Tube Co. of Am., Zanesville, O	.....	170,000	.....	.....	.....	.....	.....	.....	170,000	.....	.....
Superior Steel Co., Canton, O	.....	60,000	.....	.....	.....	.....	60,000	.....	.....	.....	.....
Timken Roller Bearing Co., Canton, O	40,000	28,000	.....	.....	.....	8,000	.....	.....	20,000	.....	.....
West Virginia Rail Co., Huntington, W. Va	.....	100,000	100,000	.....	.....	.....	.....	.....	.....	.....	.....
Whitaker-Glessner Co., Portsmouth, O	400,000	161,800	.....	.....	.....	.....	161,800	.....	.....	.....	.....
Grand Total—All Companies—Columbus District	3,182,000	2,169,475	136,000	75,000	.....	819,600	866,875	70,000	202,000	100,000	81,000
DETROIT DISTRICT											
American Car & Foundry Co., Detroit, Mich	.....	.....	(Being	Dismantled)							
Detroit Seamless Tube Co., Detroit, Mich	.....	25,000	.....	.....	.....	.....	.....	.....	25,000	.....	.....
Railway Steel Spring Co., Detroit, Mich	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Crowley Co., (Jno. A.), Detroit, Mich	18,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Total—All Companies—Detroit District	18,000	65,000	.....	.....	.....	40,000	.....	.....	25,000	.....	.....
SOUTHERN DISTRICT											
American Steel & Wire Co., Fairfield, Ala	.....	.....	.....	.....	.....	.....	.....	.....	.....	120,000	115,000
Tenn. C. I. & R.R. Co., Ensley, Ala	1,031,000	324,600	324,600	.....	.....	.....	.....	.....	.....	.....	.....
Tenn. C. I. & R.R. Co., Bessemer, Ala	.....	110,000	.....	48,000	.....	62,000	.....	.....	.....	.....	.....
Tenn. C. I. & R.R. Co., Fairfield, Ala	.....	237,400	24,000	124,000	33,200	56,200	.....	.....	.....	.....	.....
Total—U. S. Steel Corp. Plants—Southern District	1,031,000	672,000	348,600	172,000	33,200	118,200	.....	.....	.....	120,000	115,000
Atlantic Coast Line R.R., So. Rocky Mt., N. C	.....	1,000	.....	.....	.....	1,000	.....	.....	.....	.....	.....
Armstrong (G. W.) & Co., Ft. Worth, Texas	.....	25,000	.....	.....	.....	25,000	.....	.....	.....	.....	.....
Atlantic Steel Co., Atlanta, Ga	100,000	42,000	.....	.....	.....	42,000	.....	.....	.....	16,000	15,000
Central of Ga. Ry., Savannah, Ga	.....	350	.....	.....	.....	350	.....	.....	.....	.....	.....
Connors Steel Co., Birmingham and Helena, Ala	.....	30,000	.....	.....	.....	30,000	.....	.....	.....	.....	.....
Memphis Iron & Steel Co., Memphis, Tenn	.....	10,000	.....	.....	.....	10,000	.....	.....	.....	.....	.....
Ewald Iron Co., Louisville, Ky	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Ft. Smith Iron & Steel Mills, Arkoma, Okla	.....	3,000	.....	.....	.....	3,000	.....	.....	.....	.....	.....
So. Steel & Roll Mill, Inc., E. Birmingham, Ala	.....	30,000	.....	.....	.....	30,000	.....	.....	.....	.....	.....
Gulf States Steel Co., Alabama City, Ala	200,000	50,000	.....	.....	.....	50,000	.....	.....	.....	108,000	75,000
Kilby Car & Foundry Co., Anniston, Ala	.....	11,600	.....	.....	.....	11,600	.....	.....	.....	.....	.....
Knoxville Iron Co., Knoxville, Tenn	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Kentucky I. & S. Co., Louisville, Ky	.....	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Old Dominion I. & S. Co., Richmond, Va	6,000	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Tredegar Co., Richmond, Va	.....	55,000	.....	.....	.....	55,000	.....	.....	.....	.....	.....
Grand Total—All Companies—Southern District	1,337,000	1,053,950	348,600	172,000	33,200	500,150	.....	.....	.....	244,000	205,000
DULUTH DISTRICT											
Minnesota Steel Co., Morgan Park, Minn	540,000	120,000	.....	.....	.....	120,000	.....	.....	.....	100,000	85,000
Great Northern R.R., St. Cloud, Minn	.....	3,800	.....	.....	.....	3,800	.....	.....	.....	.....	.....
Grand Total—All Companies—Duluth District	540,000	123,800	.....	.....	.....	123,800	.....	.....	.....	100,000	85,000

Name of Company and Location of Plant	Total Ingots	Total Finished Rolled Product	SUBDIVISION OF FINISHED ROLLED PRODUCT (Including Tubes)							Wire Rods	Plain Wire (Net Tons)
			Rails	Sheared and Universal Plates	Structural Shapes	Merchant Bars, Bands, Hoops, Etc.	Sheets and Light Plates	Black Plate for Tinning	Tubular Products (Inc. Seamless Tubes)		
CHICAGO AND WEST DISTRICT											
American Steel & Wire Co., Rockdale, Ill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	135,000
American Sheet & Tin Plate Co., Gary, Ind.	.....	518,200	.....	.....	.....	.....	332,000	186,200	.....	.....	.....
American Sheet & Tin Plate Co., Elwood, Ind.	.....	80,000	.....	.....	.....	.....	.....	80,000	.....	.....	.....
American Steel & Wire Co., De Kalb, Ill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	115,000
American Steel & Wire Co., (Scott St.), Joliet, Ill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	123,000
American Steel & Wire Co., Waukegan, Ill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	225,000	191,000
American Steel & Wire Co., Anderson, Ind.	.....	.....	.....	.....	.....	.....	.....	.....	.....	120,000	67,000
Illinois Steel Co., Gary, Ind.	2,984,000	2,316,000	750,000	388,000	258,000	920,000	.....	.....	.....	.....	.....
Illinois Steel Co., Joliet, Ill.	708,000	237,200	.....	.....	.....	237,200	.....	.....	.....	252,000	.....
Illinois Steel Co., Milwaukee, Wis.	.....	241,900	50,000	.....	7,500	184,400	.....	.....	.....	.....	.....
Illinois Steel Co., So. Chicago, Ill.	2,457,500	1,140,500	96,000	528,000	454,500	62,000	.....	.....	.....	.....	.....
Total—U. S. Steel Corp. Plants—Chicago and West District.	6,149,500	4,533,800	896,000	916,000	720,000	1,403,600	332,000	266,200	.....	597,000	631,000
Cook, A. D., Lawrenceburg, Ind.	.....	200	.....	.....	.....	200	.....	.....	.....	.....	.....
Alliance Steel Co., Ottawa, Ill.	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
Acme Steel Goods Co., Chicago, Ill.	.....	75,000	.....	.....	.....	75,000	.....	.....	.....	.....	.....
American McKenna Proc. Co., Joliet, Ill.	.....	100,000	100,000	.....	.....	.....	.....	.....	.....	.....	.....
Calumet Steel Co., Chicago Hgts., Ill.	.....	50,000	.....	.....	.....	50,000	.....	.....	.....	.....	.....
Champan-Price Steel Co., Indianapolis, Ind.	.....	27,000	.....	.....	.....	.....	27,000	.....	.....	.....	.....
Chicago Rolling Mills, Inc., Chicago, Ill.	5,000	25,000	.....	.....	.....	25,000	.....	.....	.....	.....	.....
Colorado Fuel & Iron Co., Pueblo, Colo.	1,138,000	660,000	360,000	.....	.....	300,000	.....	.....	.....	120,000	300,000
Columbia Steel Co., Pittsburg, Cal.	49,000	25,000	.....	.....	.....	25,000	.....	.....	.....	.....	.....
Briggs & Turivas, Joliet, Ill.	.....	50,000	.....	.....	.....	50,000	.....	.....	.....	.....	.....
Ft. Dodge Culvert & Iron M. Co., Ft. Dodge, Iowa.	12,000	12,000	.....	.....	.....	12,000	.....	.....	.....	.....	.....
Ft. Wayne Roll. Mill Corp., Ft. Wayne, Ind.	.....	55,000	.....	.....	.....	55,000	.....	.....	.....	.....	.....
Globe Seamless Steel Tube Co., Milwaukee, Wis.	.....	36,000	.....	.....	.....	.....	.....	.....	36,000	.....	.....
Steel & Tube Co. of America, Kalamazoo, Mich. (Formerly Harrow Spring Co.)	7,500	36,000	.....	.....	.....	36,000	.....	.....	.....	.....	.....
Highland Iron & Steel Co., Terre Haute, Ind.	.....	50,000	.....	.....	.....	50,000	.....	.....	.....	.....	.....
Highland Iron & Steel Co., Chicago, Ill.	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Hoosier Rolling Mill Co., Terre Haute, Ind.	.....	36,000	12,000	.....	.....	24,000	.....	.....	.....	.....	.....
Indiana Rolling Mill Co., New Castle, Ind.	.....	6,000	.....	.....	.....	.....	6,000	.....	.....	.....	.....
Inland Steel Co., Indiana Harbor, Ind.	1,000,000	804,000	180,000	144,000	100,000*	260,000	120,000	.....	.....	.....	.....
Inland Steel Co., Chicago Heights, Ill.	.....	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
International Harvester Co., So. Chicago, Ill.	400,000	300,000	.....	.....	.....	300,000	.....	.....	.....	.....	.....
International Harvester Co., (Deering Wks.), Chicago, Ill.	.....	26,800	.....	.....	.....	26,800	.....	.....	.....	.....	.....
Interstate Iron & Steel Co., E. Chicago, Ind.	.....	150,000	.....	.....	.....	150,000	.....	.....	.....	.....	.....
Interstate Iron & Steel Co., (118th St.), Chicago, Ill.	225,000	180,000	.....	.....	.....	180,000	.....	.....	.....	.....	.....
Interstate Iron & Steel Co., (Grand Cross.Wks.), Chicago, Ill.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Judson Mfg. Co., Emeryville, Cal.	49,000	40,000	.....	.....	.....	40,000	.....	.....	.....	50,000	42,000
Keystone Steel & Wire Co., Peoria, Ill.	132,000	.....	.....	.....	.....	.....	.....	.....	.....	100,000	80,000
Kokomo Steel & Wire Co., Kokomo, Ind.	120,000	.....	.....	.....	.....	.....	.....	.....	.....	100,000	80,000
Columbia Tool Steel Co., Chicago Heights, Ill.	6,435	4,000	.....	.....	.....	4,000	.....	.....	.....	.....	.....
General Steel Co., St. Francis, Wis.	24,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Llewellyn Iron Works, Torrance, Cal.	36,000	30,000	.....	.....	.....	30,000	.....	.....	.....	.....	.....
Milwaukee Roll. M. Co., Milwaukee, Wis.	.....	50,000	.....	.....	.....	.....	50,000	.....	.....	.....	.....
Ohio Falls Iron Co., New Albany, Ind.	.....	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Pacific Coast Steel Co., Portland, Ore.	25,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pacific Coast Steel Co., Youngstown, Wash.	100,000	125,000	5,000	.....	45,000	75,000	.....	.....	.....	.....	.....
Pacific Coast Steel Co., San Francisco, Cal.	90,000	110,000	.....	.....	15,000	95,000	.....	.....	.....	.....	.....
Phoenix Horseshoe Co., Joliet, Ill.	.....	24,000	.....	.....	.....	24,000	.....	.....	.....	.....	.....
Pullman Co., Pullman, Ill.	.....	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Republic Iron & Steel Co., E. Chicago, Ind.	.....	60,000	.....	.....	.....	60,000	.....	.....	.....	.....	.....
Republic Iron & Steel Co., Moline, Ill.	.....	50,000	.....	.....	.....	50,000	.....	.....	.....	.....	.....
Riverdale Roll. Mill Co., Chicago, Ill.	.....	11,000	.....	.....	.....	11,000	.....	.....	.....	.....	.....
Sellers Mfg. Co., Chicago, Ill.	.....	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Simmons Co., Kenosha, Kenosha, Wis.	.....	35,000	.....	.....	.....	35,000	.....	.....	.....	.....	.....
Simmons Co., San Francisco, Cal.	.....	15,000	.....	.....	.....	15,000	.....	.....	.....	.....	.....
So. Cal. I. & S. Co., (Htgton Park), Los Angeles, Cal.	35,000	23,000	.....	.....	.....	23,000	.....	.....	.....	.....	.....
Southern Pacific Co., Sacramento, Cal.	11,975	26,000	.....	.....	.....	26,000	.....	.....	.....	.....	.....
Steel & Tube Co. of America, Indiana Harbor, Ind.	690,000	330,000	.....	180,000	.....	.....	.....	.....	150,000	.....	.....
Steel & Tube Co. of America, Evanston, Ill.	.....	80,000	.....	.....	.....	.....	.....	.....	80,000	.....	.....
Utah Steel Corp., Midvale, Utah.	30,000	40,000	.....	.....	.....	40,000	.....	.....	.....	.....	.....
Wrought Washer Co., Milwaukee, Wis.	.....	2,500	.....	.....	.....	.....	2,500	.....	.....	.....	.....
Railway Steel Spring Co., Chicago Heights, Ill.	70,000	(Tire Mill)									
Grand Total—All Companies—Chicago and West Distr.	10,405,910	8,568,300	1,553,000	1,240,000	880,000	3,825,600	537,500	266,200	266,000	967,000	1,133,000

*Inland can roll 300,000 tons heavy structural at expense of rail tonnage.

(*Continued from page 9*)

was offered originally as an exhibit in the investigation by the Federal Trade Commission of the Pittsburgh basing practice of selling steel, and no attempt has been made to modify the tables in the light of known additions to capacity in 1923 and 1924 or to make note of subsequent changes in ownership that have occurred through absorption of plants by such companies as the Bethlehem Steel Co. and by the Youngstown Sheet & Tube Co.

The total ingot capacity of the country, it will be noticed, is put at 55,500,000 tons, though for the same time (the end of 1922), THE IRON AGE estimate roughly was 53,000,000 tons. The difference arises through THE IRON AGE'S employing what may be called practical capacity, based on actual performance plus an allowance for idle units, while the larger figure is a summation of estimates based on various methods of rating as followed by the different steel companies. Practical capacity today, at the end of 1924, is still about one million tons short of the rated capacity given in the tables. The approximate amount awaits the collection of figures not complete at this writing.

The tables show a division of the industry into 14 districts, and THE IRON AGE has prepared the accompanying maps to show the centers of these districts and by means of circles of proportionate area the relative productive capacity of the districts. The Eastern district includes plants at Worcester, Mass.; Bridgeport, Conn., and Harrison and Perth Amboy in New Jersey. The Philadelphia district comprises Trenton and eastern Pennsylvania and Sparrows Point, Md. In Buffalo are included Erie, Pa., and Syracuse, N. Y. The Pittsburgh, Valley (or Youngstown) and Wheeling districts are considered separately. Cleveland, of course, takes in Lorain, Ohio. The district given the name Columbus covers such cities as Middletown and Massillon and Canton, also Portsmouth, Ohio, and the plants in Kentucky opposite Cincinnati. Detroit, not in-

cluding at the time of compilation the Ford Motor Co. development, is too small for its size to be shown by more than a dot. To the Chicago district are attached the plant at Pueblo, Colo., and the plants on the Pacific Coast, this district so considered having 10,406,000 tons of ingot capacity, but without the far Western plants, 8,842,000 tons capacity; the circle showing the size of the Chicago district is proportioned according to the latter figure.

Where there are plants of the United States Steel Corporation in each district, the fact is indicated by a section lining of the circle, the tinted area showing the percentage in each district belonging to the Steel Corporation. The Duluth circle, for example, is all tinted, while that for Johnstown, where there is no Steel Corporation plant, is solid red.

THE IRON AGE has also prepared a table showing at a glance the relative importance of each district as regards capacity in each kind of steel and also in ingots and total finished product. For every 100 tons of ingot capacity in the Pittsburgh district, Chicago can make 66 (or 78 including Colorado and the Pacific Coast); the Valley district centered at Youngstown, 55 tons; and Philadelphia, 52. The capacity of the country is 416 per cent of Pittsburgh, or for every 100 tons Pittsburgh can make, the rest of the country can turn out 316. Pittsburgh, the Valley and Wheeling together rate 174 against 416 for the country; with Johnstown and Cleveland added, the rating is 217, or over one-half, and including Columbus the rating is 241.

In the total of finished steel, Pittsburgh holds a more important position, as for every 100 tons capacity in that district the rest of the country can make 260 tons. Thus in raw steel Pittsburgh's percentage of the whole capacity is 24 per cent, but in finished rolled steel it is nearly 28 per cent. As regards the six districts above named, whereas their combined capacity is 58 per cent of the country in ingots, it is 55 per cent in finished steel. Chicago, not including Colorado and Pacific Coast, has 16 per cent of the ingot capacity and 17 per cent of finished steel capacity.

The following observations may also be drawn from the tables: Pittsburgh has 28 per cent of the steel rail capacity of the country, Chicago 21, the Philadelphia district 19 per cent, Buffalo 8½ per cent, Colorado 6½ per cent, the South 6 per cent, Johnstown 4 and Cleveland 3½ per cent.

In plates the principal plants are at Pittsburgh, providing 27 per cent, the Philadelphia district 25 and Chicago 17. In shapes, the districts, according to the capacity, begin with Pittsburgh, 34 per cent, with Philadelphia 32 and Chicago 23 next. In merchant bars they are: Pittsburgh 24, Chicago 21, the Valley district 11, Philadelphia 10.

Sheet capacity by districts is: Pittsburgh 22 per cent, Columbus 20, Valley 18, Wheeling 15, Chicago 13. In black plates for tinning: Pittsburgh 29 per cent, Wheeling 26, Valley 21, Chicago 12.

In tubes, Pittsburgh has 41 per cent of the country's capacity, the Valley district 15, Cleveland 12 and Philadelphia and Wheeling, each about 9½. In plain wire, Pittsburgh has 28 per cent of capacity, Chicago 20, Cleveland 12 and Philadelphia 8.

Summarizing, it is to be noted that the Pittsburgh, Chicago and Philadelphia districts have over two-thirds of the country's capacity in rails, plates and shapes; that with the Valley added they have two-thirds of the country's capacity in bars, and that the same three with Cleveland have over two-thirds of the country's capacity in plain wire. It likewise takes four districts to total two-thirds of sheet capacity—Pittsburgh, Valley, Wheeling and Columbus; but three suffice to reach the two-thirds in both black plate and pipe—Pittsburgh, the Valley and Wheeling in black plate and Pittsburgh, Valley and Cleveland in pipe.

Excess Capacity

The tables show further that on the average there is between one-fifth and one-fourth excess in finishing capacity over the capacity to make the raw steel. The total finished rolled product as listed is in a not unusual ratio to the ingot capacity of 78 per cent (or 43.2 million tons to 55.5 million tons of ingots), but the total of the listed capacities for rails, plates, shapes, bars and the like, estimating the forms of rolled steel not specifically covered as amounting to 5.6 million tons, is 52.9 million tons, or 23 per cent above the 43.2 million tons which may be made from the ingots. Of course, this means that of several forms of steel made in a given plant all are not likely to be simultaneously in full demand. Using capacity figures given, the production in 1923 in rails was only 50 per cent of capacity and plates 57½ per cent and bars 44 per cent, but 78 per cent of the black plate, 81 per cent of the sheet, 84 per cent of the pipe and 92 per cent of the structural steel capacity was made in 1923. What the situation was for 1924 is charted elsewhere in this issue.

For Every 100 *Tons of Capacity in the Pittsburgh District—in Steel Ingots, Total Finished Steel and Various Forms of Rolled Products—the Other Districts Have the Capacity Listed Below:*

	Total Ingots	Finished Rolled Product	Rails	Plates	Structural Shapes	Bars, Bands, Hoops, Etc.	Sheets	Black Plates for Tinning	Tubular Products, Inc. Seamless Tubes	Wire Rods	Plain Wire
Pittsburgh	100	100	100	100	100	100	100	100	100	100	100
Chicago, excl. Colo. and Pacific Coast	66	62	74	62	66	85	58	40	15	69	74
Valley	55	35	..	34	..	46	81	71	37	25	21
Philadelphia	52	52	68	91	95	40	15	14	23	24	29
Cleveland	27	16	13	16	..	15	23	4	30	42	43
Columbus	24	18	8	4	..	22	93	11	11	8	7
Buffalo	21	15	31	12	11	21	9	..	1	13	9
Wheeling	19	17	..	7	..	6	67	90	23	..	..
Johnstown	16	11	15	17	13	13	..	..	..	10	8
Southern	10	9	22	9	3	14	..	..	..	20	18
St. Louis	5	9	6	17	..	13	14	14	..	3	1
Eastern	5	6	..	..	..	18	..	..	2	16	17
Duluth	4	1	..	..	..	3	..	..	..	8	8
Detroit	..	..	..	..	..	1	..	..	1	..	..
Colo. and Pac. Coast	12	9	23	..	5	18	..	..	..	10	27

ONE of the Earliest Types of Airplane, Practically All Wood and Fabric

An All-Metal Airplane (Below). The designer of this airplane built the first iron flying machine in the world in 1915

Will the Future Airplane Be of Metal?

Trend at Close of the War—Metal Now Used in Wings, Propellers, Tubes and Other Parts—Many Advantages Over Wood

BY LIEUT. CORLEY MC DARMENT*

NOT long ago the general public would have thought of an iron airplane in the same category as a stone velocipede. Also the first airplane designers and the first men who tried out the kite-like flying machines would have smiled at the possibility of ever using anything else except the lightest of wood and thinnest fabric in the construction of flying craft.

Trend Toward Metal During the War

But just as the trend of engineering has always been toward replacing wood with metal, so has the new branch of aeronautical engineering followed tradition and sought ways to substitute metal for wood. The use of metal in aircraft construction is therefore only a natural consequence in the growth of engineering.

Within the past few years the discovery has been made, however, that if the Great War had lasted a while longer metal airplane construction would have been far advanced over the present stage. When the smoke of battle had cleared away and the secret preparations of the Central Powers and the Allies began to come to light, the world learned with amazement that ironclad monsters of the air were about to be launched. The iron birds were to carry bombs, poison gas, liquid fire and small cannon. The metal construction of the craft was designed to turn aside rifle fire and shrapnel. They were to fly low over the trenches, hostile cities and terminals and work destruction never before realized in either war or peace.

The Germans managed to launch a few small experimental machines for combat work and the success was such that an elaborate program was laid out for further development along this line. One of these metal airplanes with thin wings was peppered with 400 bullet holes without greatly destroying its flying ability. This particular machine was not built to turn bullets with the wings, but the fuselage being more heavily armored withstood the fire. While the wings were receiving 400 shots, the fuselage where the pilot sat was turning a proportionate number.

Face to Face with the All-Metal Plane

But the iron airplane designs dropped along with everything else when the war ended. Little was heard of them, especially in America until one day in 1920 a foreign journal carried the report of a giant metal airplane which had been designed in Germany near the close of the war. This airplane was large enough to carry 20 people and a cargo of bombs, poison gas and liquid fire. The particular interest this airplane had for Americans was that it was built for a raid on New

*Assistant to chief, information division, War Department, Washington.

WE are face to face with the all-metal airplane, says Lieutenant McDarment, an authority on airplane construction. A giant metal German airplane was built at the close of the war to fly to New York! A shortage of wood, together with its limitations, is driving designers to metal. Flying and airplane building is still an art, and for science in it there is a crying need. Metal wings and propellers already are a success.

York! It was to fly non-stop from Berlin to New York. Interest in metal construction was aroused, and the secrets of the German engineers probed into to find out something new.

It then leaked out that the Germans had advanced far in the use of metals for airplane construction, but that progress was at a standstill. Use of metals then began to take a rise among engineers and today we are facing the all-metal airplane, not only for military use but for commercial purposes. A few engineers who have given study to this phase of development are enthusiastic over metal and they assert with all confidence that metal is sure to replace wood and fabric in airplanes. After listening to a lecture by a metal enthusiast, one is pretty thoroughly convinced on the subject. The wood and fabric people, however, are not doing much talking in defense of these materials, probably feeling no defense is necessary—they stand on their own merits.

Wood and Its Testing

But with such advantages as wood and fabric possess in aircraft manufacture, the fact remains that the world may be forced to use metal due to wood shortage. The United States uses four times as much wood every year as is being grown. Only the choicest portions of a whole forest can be used as suitable airplane material; the supply for a great number of airplanes dwindles, therefore, with the destruction of forests. Nor can the wood used in airplanes be sent from the forests to the factory and put into construction at once. All this wood must be properly seasoned, inspected and tested.

This matter of inspecting wood leads to one of the chief difficulties in its use. The only way to compare the tensional and compressional strength of two pieces of wood is to break them. And the variability of wood is well known. It is affected by its growth (age), water content, grain, rot and even the soil in which it grows. If a spruce member will stand 4000 lb. to the sq. in. an airplane manufacturer does not dare place more than 3000 lb. upon it. This is not the case with metals. An engineer can tell within about 5 per cent what a piece of metal will stand if it has been put through a standardization process. Even the so-called "nervous" alloys can be determined in production quantities.

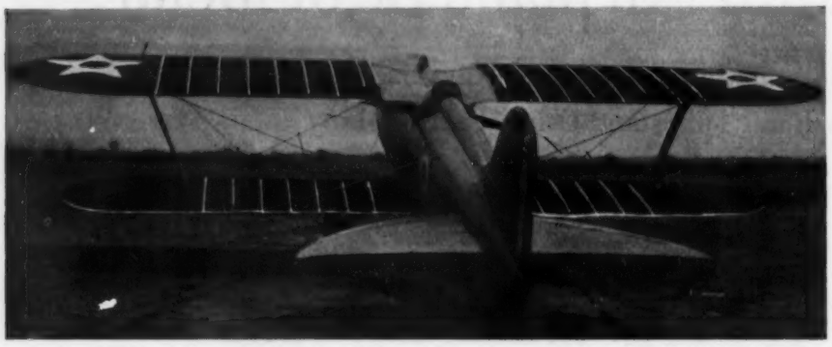
Flying Still an Art; Science a Need

Before entering into the relative merits of wood and metal airplanes and the probable future use, a glance at the inside of aviation as a whole is interesting and necessary. Flying started as an art. It is still an art. Building airplanes, too, began as an art and is still largely an art. But never has there been an occupation that should be built strictly upon science! Science is stepping into the game more and more every day, but science has a long road to travel before it catches up with the fine and dangerous art of flying. Flyers themselves are more like painters, who care little about the composition of the canvas and paints so long as results can be obtained.

Aviation is now crying out to science to help solve some of the perplexing problems arising with the greater and more varied use of airplanes—especially in high-speed work. No airplane has yet been built in which the designer, manufacturer or the man who flew it knows *all about it.* Most airplanes are put together with members which look as if they ought to hold. In the early day an airplane maker would pick up a piece of bamboo, sight down it like a rifle barrel, bend it and, if it did not crack, it became an airplane spar. Everything was empirical in the extreme.

It will take some years yet before the pure art in airplane construction gives way to pure science. And when science finally does determine and dominate airplane construction, manufacturers will begin to edge in on art for beauty's sake, the same as in automobile making today.

But as stated above, science is taking a big hand in construction of aircraft today. Every government has its experimental shops and every large aircraft manufacturing plant has its staff of technicians. The wind tunnel was the first big step of science into the field of aviation. One of the important things the wind tunnel has done is to help keep wings on airplanes. Now, whenever some artistic gentleman has a new idea in airplane design, especially something pertaining to wings, a model machine is set up in a wind tunnel where a heavy stream of air is run over it and if the wings stay on, they will probably stay on in the air.



Showing the Metal Wing Radiator, a Novelty in Airplane Design

Before wind tunnels, it was necessary to take an airplane up into the air and test it out to see if the wings would stay on. This was not a very choice job either, especially since parachutes were not developed at that time. Many a good flyer has discovered to his everlasting dismay that he made a wrong guess as to the strength of his wings.

Science and Greater Safety

It has been this stepping-in of science that has led to greater safety in flying, and to the substitution of metal for wood and fabric in construction. The very first use of the lighter metals in airplane construction came through the desire for lightness in airplane engines. The older gasoline motors were very heavy per horsepower and the maximum power and minimum weight has been the goal of engineers since the first powered airplane left the ground 21 years ago.

An attempt to squeeze one horse power into one pound of weight is the immediate object of airplane engine designers. Of course, as soon as this is accom-

plished, the next objective will be to get one horse power out of half a pound of metal. But the use of metals in airplane engine construction is a big field within itself and cannot be entered into here. The big problem and the one that may soon revolutionize aeronautical engineering is the use of metals for the airplane alone.

It was the finger of science that pointed to metal in airplane construction. With all the apparatus used in attempts to figure tension, compression and torsion in materials like wood and fabric, no very satisfactory set of figures have been produced that will enable a manufacturer to say: "This is true, and that is true." The trouble is that every different kind of wood has a different set of figures for it alone, and these theoretically change from day to day with the weather. This cannot be said of metals.

Fabric or Metal in Wings

The use of fabric for wing covering has been popular. The popularity of fabric wings has also been given impetus through the world flight for on this long journey in which the airplanes passed through the extremes of the world's climate, including the blizzards off the Alaskan coast, and the torrid rainy season of India, the fabric stood up, as did the other members of the machines which were made of wood. The wings of these airplanes were not changed during the entire journey around the world.

It should be noted, however, in the construction of these airplanes that flew around the world considerable metal tubing was used, where a few years ago nothing but wood would have been thought of. But the good showing of the fabric in the world flight does not augment against the use of metal for airplane wings, provided aeronautical engineering proceeds as well as it has in the past few months.

Metal wings will be the last thing in universal aircraft design. Metal wings are undoubtedly heavier than those of wood and fabric. This is one thing that mitigates against their general use at the present time. Metal wings have been used, however, and with good success, and in fact whenever metal construction is mentioned in connection with airplanes, "wings" are the first thing thought of and metal wings are usually implied in the term.

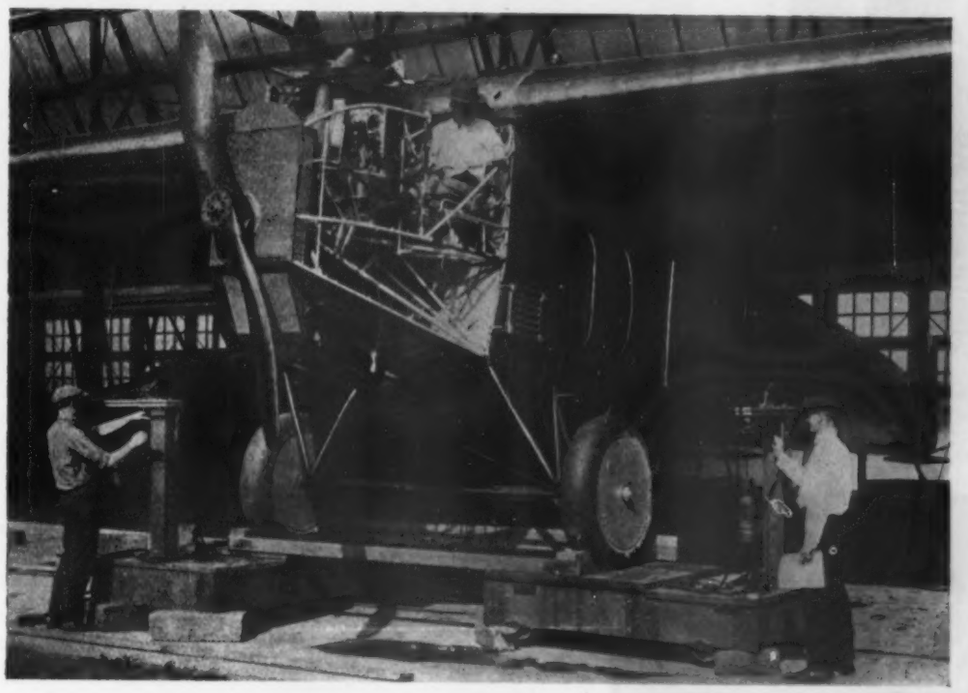
Metal engine beds and fuselage framework in the form of tubing have definitely come into general use, and now metal spars and ribs have crept into the framework of the wings. These wing members are usually built up on the truss principle and the skill in making such parts is borrowed from the bridge builders.

The Bridge Engineer and the Airplane

It has been said that the science of bridge building has made metal airplanes possible and that a bridge engineer should make a good aeronautical engineer. Indeed, the engineer who would use metal in airplanes works exactly on the same lines as the designer of bridges. The same forces that enter bridge construction come into play with airplanes. That is, all the bridge problems enter, and several additional ones. If a bridge were made to fly as well as cross a stream, the difference between bridges and airplanes would be slight. But a single built-up metal spar in an airplane wing will have all the stress and strain put upon it as a bridge. Of course the metals used in airplane wings are the lighter ones—aluminum products.

If it can be shown that all-metal airplane wings are more economical, safer, and easier of manufacture than wood and fabric ones, the world will no doubt accept them in spite of the increased weight. Some metal enthusiasts now insist that eventually metal wings can be made lighter and far stronger than the old ones. When this happens the question is settled. Metal will be universally used. There is but one other very good argument for wood and fabric over metal besides weight, and that is, metal requires more expensive tools. But when quantity production begins, this factor will become negligible.

Some ordinary comparisons between metal and wood certainly indicate that the former will be used in future development. The tests of reliability between wood



Note the Steel Construction of the Engine Bed of This Airplane, Which Made a Non-Stop Flight from New York to San Diego, Cal., in 1923

and metal have already been mentioned, and among other comparisons the following may be stated in behalf of metals:

1. Longer life of metal.
2. Better resistance to climatic conditions.
3. Reduction of fire hazard.
4. Metal does not become water soaked.
5. Uniformity of parts.
6. Ease of manufacture in bulk.
7. Armor in time of war.
8. Reliability of technical data.

Deterioration of Wood and Fabric

The wood used in airplane construction certainly does deteriorate with time. Whenever landing gears on airplanes become a few years old, the pilot looks for them to snap off with almost any landing. Rot sets up in wood and it cannot be detected from the outside. There are species of insects too which infest wood and cause failure, sometimes when least expected. Fabric too becomes what airmen call "dead" in time.

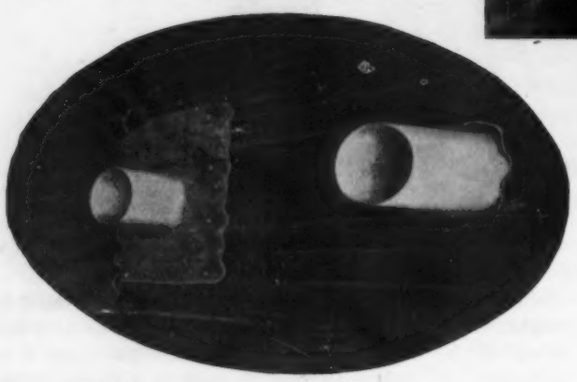
The fabric on the wings of the airplanes that flew around the world was dead when the machines got to America. Aviators can detect dead fabric by the feel of the plane in the air, as it does not climb fast and easily as when new fabric is used. A so-called dead metal wing is also possible, but tightening a few rivets or bolts would undoubtedly overcome this defect. Also when wood breaks, it often splinters and endangers the life of pilot and passengers. This occurs in the event of crashes, and airplane crashes must be taken into consideration, for as long as flying is done accidents will happen. It is the same with automobiles, trains and steamships.

An ideal airplane fuselage would perhaps be one shaped like a projectile which could be heavily padded inside, yet stay intact after striking some object with great force. In fact, metal containers for the safety of pilot and passengers in aircraft are now being designed along these lines.

It is well known how wood swells when it becomes wet, and how it warps in the sun. These two characteristics are certainly undesirable for airplanes. A change of one-sixteenth of an inch in some parts of an airplane will greatly affect its flying qualities. Whenever wood warps or swells enough to start the glue, holding wood to wood or wood to fabric, serious things can happen. The fabric on airplane wings has been known to blow off in the air with disastrous results. In the rainy tropics airplanes of wood and fabric are very unsuited. Constant trouble is experienced with the glue and warping of the wings.

From a Block of Solid Steel (Left) Comes This Beautiful and Elaborate Airplane Cylinder of the Air-Cooled Type

The Fastest Airplane in the World (Above) Equipped with Metal Propeller. Note the peculiar shape of the blades near the hub, a design from experiments with metal propellers. The metal bullet-shaped cap at the end is for streamline effect



Side of a Fusilage (Left) of All-Metal Airplane Showing Same Corrugated Steel Covering as in Wings. The exhaust pipes of the engine extend out only a few inches from the metal side. Long exhaust pipes are necessary in wood and fabric construction on account of the fire hazard

Metal Propellers

Wood is even being supplanted by metal in airplane propellers. Wooden propellers have always given trouble on account of the moisture affecting the glue. These propellers are made by glueing, under high pres-

sure, several layers of wood together, then cutting out the blades and, with all the care and skill put into the making, no way has been found to prevent splitting. Metal tips have been used with great success, however, for several years. The metal tips are usually of copper, and they offer protection to the thin blade. Whenever a wooden propeller passes through rain or hail, the blade becomes knicked and finally out of balance.

An all-metal propeller has now been produced and the highest speeds ever made by man have been with this propeller. One of the most interesting forms of metal propeller is one that is very excellent and can be easily bent with the hand like the blade of a butcher knife, but when it is whirling it is quite rigid. Centrifugal force does the work.

Fire Hazard and Metal Planes

The fire hazard in metal airplanes should be much less than in those of wood and fabric, contrary, however, to the experience with one type of all-metal machine used temporarily by the United States Post Office Department. Fabric and wood catch fire very quickly and, fanned with a 90-mile wind caused by the passage of the airplane through the air, it takes but a moment for a machine to become a wreath of flames.

In a metal machine, with the fuel containers removed a sufficient distance from the fuselage, time for a landing should always be had after a fire breaks out. But the fire hazard in the air has practically become a thing of the past in flying. Very seldom does a fire break out in the air, but gasoline tanks still burst when a machine crashes to the ground, and here most of the fires occur. An airplane wing made of metal could become redhot without affecting its lifting qualities in the air.

Metal does not soak up water like wood and fabric. An ordinary wooden airplane will soak up over 100 lb. of water on a damp day, and flying boats with large wing areas will take up 700 lb. of water on rainy days. Water of course runs off metal like a duck's back. While iron is of course susceptible to rust, this drawback is not considered as bad as rotting in wood.

This one factor (not soaking up water) alone is put forth as sufficient for the use of metal wings, and it overcomes the original weight difficulty. When the weight is considered and the progress in iron work remembered, one gets a glimpse of metal wings even lighter than those of wood and fabric. Good strong sheet metal of 0.004-in. thickness has been produced.

With metal used in aircraft of standard design, a great uniformity of parts would result. This would be economy of upkeep and repair. An airplane owner could land and buy a new airplane wing like stopping and buying a new automobile fender. Wood does not admit of shaping like metal, which is another advantage for the latter, for in airplanes there are many needs of unusual shaped members. Metal strut fittings have long been used. Metal parts of an aircraft can be easily manufactured in bulk, but not so with wood.

Metal Planes for the Next War

In case of another war, metal airplanes would no doubt spring up overnight. The armor features as well as the ease of manufacture in quantity would be large controlling factors. But it is a mistake to imagine that ordinary wood and cloth airplanes can be converted into metal machines by merely substituting metal for wood or fabric. An entirely new angle of engineering is involved. The technical data on metal tension and compression, etc., are entirely different from wood and metal construction. It is a science and, it may be said, an art too, within itself.

Today really two schools of manufacturers have sprung up—the metal, and the wood and fabric. The reliability of the technical data in metal work mitigates far toward working out scientifically the data necessary in correct airplane construction. With all that has been done, the science of airplane construction is so involved that it will take many years yet before enough data will be compiled to enable a manufacturer to know all about the machine he builds.

The scientific mind likes to build upon the most reliable figures obtainable. And these are certainly to be found among the metal workers. When bridges began to be constructed of steel instead of wood, engineering with wood became practically a lost art until airplane building came along. Of course carpenters used principles in constructing houses of wood but the science necessary for highly technical work like airplanes was not found. So, taking all the factors into consideration, one can scarcely doubt that the future airplane will be of metal construction.

Joint Safety Meeting to Be Held at Baltimore in January

Plant safety conditions and the functions of plant medical departments are among the topics of a conference to be held at the Emerson Hotel, Baltimore, Jan. 23, under the joint auspices of the Baltimore Safety Council, the American Society of Safety Engineers and the engineering section of the National Safety Council.

Frank J. Roberts will represent the steel group and E. Everett Gibbs the sheet metal and can manufacturers' group, at a symposium on safety kinks, safety equipment and educational stunts. Exhibits and slides will be used to illustrate the addresses at the symposium at which several industries will be represented. At the luncheon meeting, Dr. R. W. Locher will outline the function of plant medical departments. Addresses on industrial ventilation, illumination, plant design and housekeeping methods will be given at the evening session. There will also be discussion of exhibits of first aid material, industrial chairs and other equipment.

Dr. L. A. Shoudy, Bethlehem Steel Corporation, Bethlehem, Pa., will speak at the evening session. "Hindsight vs. Foresight," a new film of the National Safety Council, will be shown at the conclusion of the dinner meeting.

Pacific Coast Steel Co. Takes Over Southern California Iron & Steel Co.

SAN FRANCISCO, Dec. 20.—The Pacific Coast Steel Co., Rialto Building, San Francisco, today took over the plant of the Southern California Iron & Steel Co., Los Angeles. The Pacific Coast Steel Co., of which Elliott M. Wilson and D. E. McLaughlin of San Francisco are president and vice-president, respectively, now has plants in South San Francisco, Portland, Ore., and Seattle, Wash., and the Southern California plant is a new link in its chain. The company was incorporated May 13, 1909, a consolidation of the Portland Rolling Mills, the Seattle Steel Co. and Pacific Coast Steel Co.

In May, 1924, it increased its capitalization from $1,000,000 to $6,000,000, and distributed about two-thirds of the new capital stock to stockholders. The capital structure was changed to bring the company's capitalization on a parity with its assets account, which at that time was listed at $5,778,110. The stock distribution was equivalent to a 400 per cent stock dividend. The company manufactures open-hearth steel products, and has an annual capacity of 300,000 tons.

The Southern California plant has a capital stock of $1,500,000, with its net income listed at $113,045, and its gross revenue at $1,801,000. Its plant is located between Vernon and Huntington Park and covers 25 acres.

Wise Use of Mineral Wealth Imperative

Prosperity Rests Upon Natural Resources, Largely Coal and Iron, Which Must Be Conserved—Assets Which Have Made the Nation Great Are Being Lavishly Exploited

BY RICHARD F. GRANT

WITH the close of another prosperous year for the business and industry of our country it is fitting that we should pause for a moment to consider the bases upon which much of this prosperity is supported and sustained.

For the first century of its national existence this country was largely an agricultural nation. Even as late as 1892 four-fifths of our exports were made up of agricultural products.

During Colonial days our attempts at manufacturing were immediately stifled and the colonies were encouraged and permitted to produce and export only raw materials. It was many years before the United States recovered from the effects of this policy. Our industrial renaissance came late, fully a third of a century behind Great Britain, but, thanks to a benign Providence that endowed us liberally with vast deposits of the important natural resources, we have advanced rapidly and during the past few decades have attained world leadership in the great basic industries.

The history of our industrial advancement is largely the history of iron and coal. These two minerals, the backbone of our mechanical achievements, have supplied the metal for our tools and engines and the fuel and power for motivation. Without them our modern industrialism would not be possible.

Great Increase in Production

Starting with 3000 tons in 1820 we have seen our annual production of coal much more than double each decade. Since 1910 the rate of growth has been slower —the increase being some 20 per cent recently.

Similarly our iron production was but 20,000 tons in 1820. During the next ten years the industry made an increase of 725 per cent and has continued to grow at a rate of 80 per cent per decade until 1918. Since then there has been a slackening, although during the past two years we have approached our war time peak production.

From its start in 1860 we have seen our petroleum production more than double each decade, reaching the enormous total of almost three-fourths of a billion barrels for the year 1923.

The year 1845 marks the beginning of our copper industry with a production of 112 tons, mainly from the newly discovered Michigan deposits—an amount which some of our larger mines now produce in a few hours. During the rest of that decade production increased 50 per cent per year. Since then it increased on an average of more than 80 per cent per decade until the after-the-war slump in 1919.

Aluminum is another metal which has shown a phenomenal growth. This industry started with a total production of 75 tons during the first seven years (1883-90) of its existence and grew to an output of over 100,000 tons annually during the war period.

The progressive increase in production of many of our minor natural resource commodities, lead, zinc, sulphur, phosphate, cement, and others, is equally impressive. Practically all of them have increased at least 50 per cent per decade and some of them have increased, at times, as much as 50 per cent in a year.

Where Are We Drifting?

While we may properly take pride in the growth of these industries and the place they have taken—we lead the world in the production of petroleum, coal, iron, copper, lead, zinc, aluminum, sulphur and phosphate—it is high time for us to stop and consider where we are drifting.

President Coolidge recently called attention to our timber situation, pointing out that our reserves have been reduced to 746 billion cubic feet, while the annual cutting rate is 22.4 billion and the increment through growth is but 6 billion—briefly, that we are using up our timber four times as fast as it grows.

Our timber reserve is visible. Foresters and cruisers can be sent into the woods to measure the supply, the amount of devastation and the rate of growth. Unfortunately we cannot estimate our mineral reserves with the same degree of accuracy. Consider petroleum. Some of our leading authorities state that at present rates of production our known reserves will be exhausted in 20 years. The exact figure is immaterial. Double or treble it, if you wish. One cannot ignore the fact that the oil situation is sufficiently serious to cause the Secretary of the Interior to recommend the appointment of a permanent commission to carry on the work of the present temporary commission and outline a national policy for this commodity so essential to our modern industry and national security.

Although we are in a more comfortable position as regards our reserves of coal and iron—our economists inform us that at present rates of production our sup-

AS president of the Chamber of Commerce of the United States, Richard F. Grant has been an able advocate of conservation of natural resources of the country and of the following of a sanely progressive policy in the industrial affairs of the nation. He has traveled widely since his election last June to his present position. His policies have been a natural result of his studies at college and his long business experience. Mr. Grant was born in 1870, is a graduate of Yale, practiced law for a time in Duluth, was a member of the Minnesota Senate, and in 1909 was appointed general counsel of M. A. Hanna & Co., Cleveland. He became a partner in that firm in 1917 and in 1923, when its interests were taken over by the M. A. Hanna Co., he was made vice-president. Mr. Grant was appointed by President Wilson a member of the National War Finance Committee of the American Red Cross and served as chairman of the membership and finance drives for Ohio, Indiana and Kentucky in 1917.

plies will last many hundreds of years but with a steady decrease in grades and increase in costs—we must see to it that they are exploited wisely and prudently. The reserve tonnage in some of the leading districts is already diminishing rapidly, predicating changes in the importance of some sections and shifts in centers of manufacturing not only in this country but throughout the world.

The minor commercial metals, copper, lead and zinc, present problems approaching in seriousness that of petroleum. With each of these metals consumption and production have progressed recently more rapidly than replacement by discovery of new deposits and our known reserves at present rates of production will last at most but a few decades more.

Modern developments in the iron and steel industry have made specially important minerals, such as manganese, chrome, tungsten, vanadium and molybdenum. These ferroalloys each have their peculiar part to play—manganese as a purifier; chromium for hardness and non-corrosive qualities; vanadium for toughness and torsional strength, particularly for gears, piston rods, transmission shafts and gun barrels; tungsten for its self-hardening quality, indispensable in high-speed tools.

Minerals of Great Importance

They have become so essential that the War Department has listed them as strategic minerals of critical importance. Exhaustive studies of each have been made by committees of specialists appointed by the Mining and Metallurgical Society and the Institute of Mining and Metallurgical Engineers. Their reports deserve careful consideration. They set forth a grave situation.

The manganese committee reports that we produce less than 10 per cent of our requirements; that our total reserves amount to little more than two years' supply should importations be cut off, and this can be produced only at double the present price; and most significant of all, that these small reserves would not be immediately available during an emergency. In fact, during the first year we could produce only 23 per cent of our needs.

The reports of the other committees are equally significant. They point out that our reserves of most of these minerals are extremely limited and that domestic production is depleting further these already scanty deposits while there are few replacements, or even the possibility of replacements, by discovery of new ore bodies.

Building Up the Country

Our rapid exploitation of our natural resources and their conversion into tools, machines, communication facilities, cities and other forms of material wealth has been a necessary and important factor in building up our country, but we must appreciate that it has been at no small price. We have but one crop of minerals. We have drawn on them at an unprecedented rate. We still have much—more, indeed, than many less fortunate nations. It is incumbent upon us to use our remaining assets in a manner that will yield the greatest possible return to this and succeeding generations.

Much can yet be done by elimination of waste, by better utilization and by technical improvements. Some two-thirds of our petroleum and one-third of our coal is left in the ground—probably never to be recovered. Approximately two-thirds of our forest cut is lost. Our best steam engines develop less than 15 per cent of the fuel energy put into them. There are many other instances. Such problems are important to all industry, but they are vital to the natural resource industries.

We, therefore, expect these groups to take the lead in research, studies and investigations of our mineral resources and the formulation of policies which will assure a continuance of the prosperity of American industry and the general welfare of the nation.

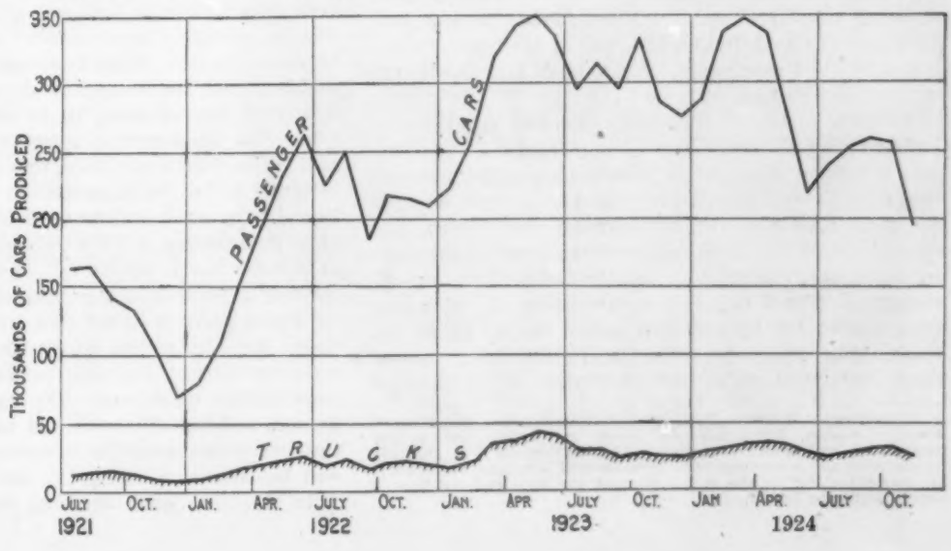
Three and One-Half Million Automobiles

During the first 11 months of 1924 American automobile manufacturers have turned out 3,015,511 passenger cars and 333,637 trucks, according to revised figures of the Department of Commerce. If December shows a total of 200,000 in both classes, or 28,500 less than November, the aggregate for the year will be about 3,550,000 vehicles.

Except for the first three months, 1924 did not provide so large a production of automobiles as was had in 1923. The year started out with a rush and March, with 348,356 cars, showed the highest monthly figure ever recorded, with the exception of May of last year, which had 350,460. The slump after April, however, was pronounced—so much so that June provided less than two-thirds the number of the preceding June and no month since March has equalled the corresponding month of 1923.

Comparative figures for the first six months, the first eleven months and (except for 1924) the entire year are shown in the table:

	First Six Months	First Eleven Months	Entire Year
Passenger cars, 1924....	1,806,515	3,015,511	.....
Passenger cars, 1923....	1,330,956	3,361,744	3,637,216
Passenger cars, 1922....	1,036,568	2,131,824	2,339,839
Trucks, 1924.....	191,712	333,637	.....
Trucks, 1923.....	200,250	348,672	376,444
Trucks, 1922.....	116,174	226,273	246,679



Second Only to 1923, the Year Just Closed Provided More Than 3,500,000 Cars, About 10 Per Cent of Them Trucks. Some 80 per cent were of the light type, both in passenger cars and in trucks

Former German Dock Lifts Former German Ships

Huge Floating Dock, Designed for Submarine Testing, Came Into British Hands and Is Now Used for Recovering Ships Sunk at Scapa Flow

BY G. ATKINSON*

At the end of 1918, just before the end of the war, the Germans completed the construction of a huge floating dock specially designed for the testing of their submarines, which had assumed so much importance in their naval prosecution of the war. This floating dock was entirely unique in build. Over 400 ft. long and 130 ft. wide, with a cylindrical chamber 40 ft. in diameter and weighing about 2000 tons, running its whole length, the dock presented a wonderful feat in marine engineering skillfulness.

The burden of this tremendous cylinder, made of 1¼-in. thick plates, did not detract from the graceful lines of the whole structure, as will be seen from an accompanying illustration. The dock was capable of being submerged so that it could receive the submarine into its chamber, where hydraulic pressure afforded the tests required. That is why it was known as the submarine testing dock, but it was in addition a floating dock, inasmuch as it could drydock two submarines as well, each being berthed between the walls and the outside of the cylinder on either side.

It is immaterial now to conjecture whether in the short time following its completion just prior to the cessation of hostilities its usefulness justified its conception, but it is certain that in all the skill and ingenuity which devised its massive construction no semblance of an idea was foreshadowed as to the ultimate use to which it was to be put. No doubt the British Admiralty, into whose hands it came after the armistice, considered its usefulness concerning the testing of their submarines, but whether they did not appreciate the method or whether international arrangements forbade their adoption of it, the submarine-testing floating dock, on being offered to shipbreakers, found its way into the hands of Cox & Danks, Ltd., one of the biggest companies of steel merchants, stockholders and shipbreakers in Great Britain.

To them, at first, it was just a breaking up job in the ordinary way of business. All shipbreakers have perhaps a vestige of regret in demolishing a fine piece of work, and it was particularly so here. Sentiment of this kind was, however, not entirely suppressed, and when the dock had been towed to the firm's shipbreaking depot at Queenborough and berthed with the dreadnoughts Erin and Orion—the demolition of which was being performed by the firm under the terms of the Washington conference—Cox & Danks, Ltd., invited about 300 members of the Institution of Mechanical Engineers to view the dock and observe its unique features.

It was only a week or two and the huge cylinder began to disappear and the resultant plates were going to British mills for rerolling. Still the potentialities of the dock for a greater sphere than the provision of rerolling plates and scrap clamored for expression. It was E. F. Cox, managing director, who, realizing the tremendous lifting capacity of the dock, wanted something big to lift. It was perhaps a little ironic that he should conceive the notion of attempting the lifting of the German sunken warships at Scapa Flow with a German floating dock. About a week's prospecting at Scapa Flow showed him that here was indeed something big enough to lift.

The Germans scuttled their ships in June, 1919, it will be remembered, and during five years they had been regarded as a hopeless and unprofitable proposition by salvage experts. Mr. Cox was fairly confident he could do it. Expert salvage opinion was against the idea and the managing director of Cox & Danks had never had anything to do with salvage work in his life. The fundamental asset was the dock, and he backed his own convictions by embarking upon what is believed to be the biggest salvage enterprise known. Four of the sunken German destroyers and the capital ship Hindenburg were purchased from the Admiralty at a price "as is where is," and an option secured on the major portion of the remainder.

The demolition of the dock was now being carried on under Mr. Cox's own supervision. Paradoxically, his direction turned the destruction of some parts into construction of others. The cylinder entirely disappeared, and one side-wall and part of the under-structure were cut away as indicated in the pictures. It will be seen that along the new face of the pontoon 6 in. diameter steel shafting fitted with specially de-

*Co-director with E. F. Cox of Cox & Danks, 168 Regent Street, London, England. An event to which the author frequently refers with undisguised pleasure is his shaking hands with the American round-the-world airplane fliers while he was standing on the small part of the Hindenburg that it was possible to board.

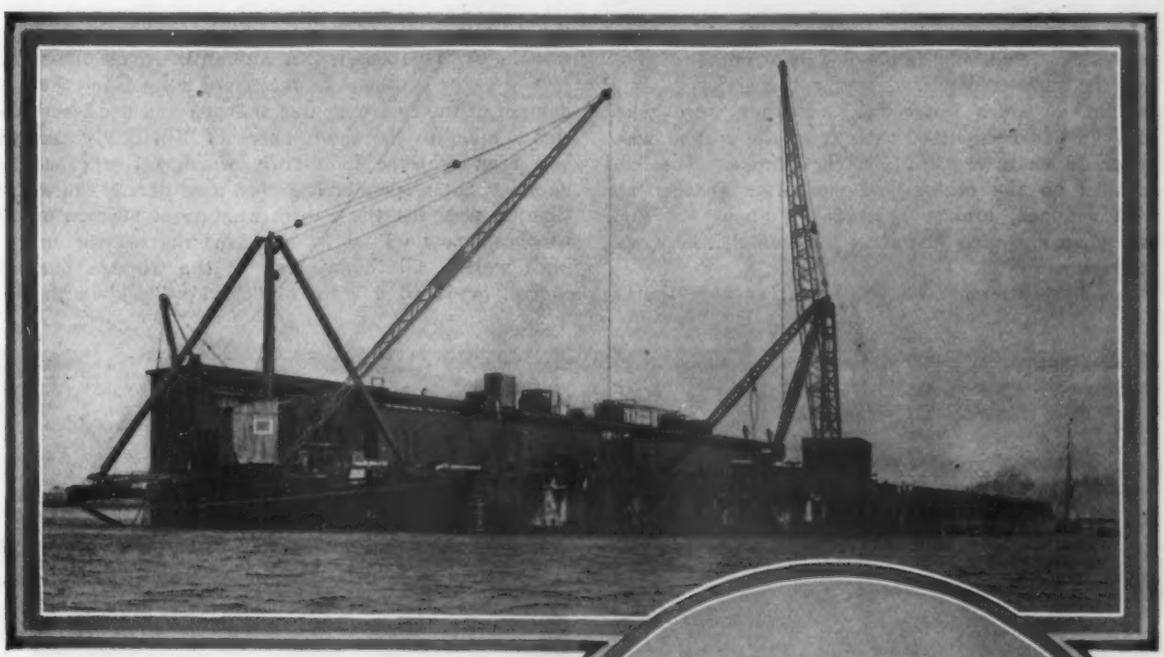
signed 42-in. diameter pulleys with a face shaped to take either cable chain or wire ropes were erected running the whole 400 ft. of length. The other wall was allowed to remain and was converted into workshops fitted with compressors, generators, drilling machines, lathes and a miscellany of other machines and tools to provide the self-equipment of the dock.

Twenty triple-geared hand winches each with a capacity of 10 tons direct off the drum were bought. Twenty pairs of five and six sheave blocks with 20-in. sheaves, all specially made and capable of a lift of nearly 150 tons each, with their complement of 4-in. circumference wire rope, were next installed for working in conjunction with the winches. This constituted practically all the preliminary work at Queenborough, but the whole structure of the dock was refashioned and transformed until it was difficult to recognize the original old in the converted new.

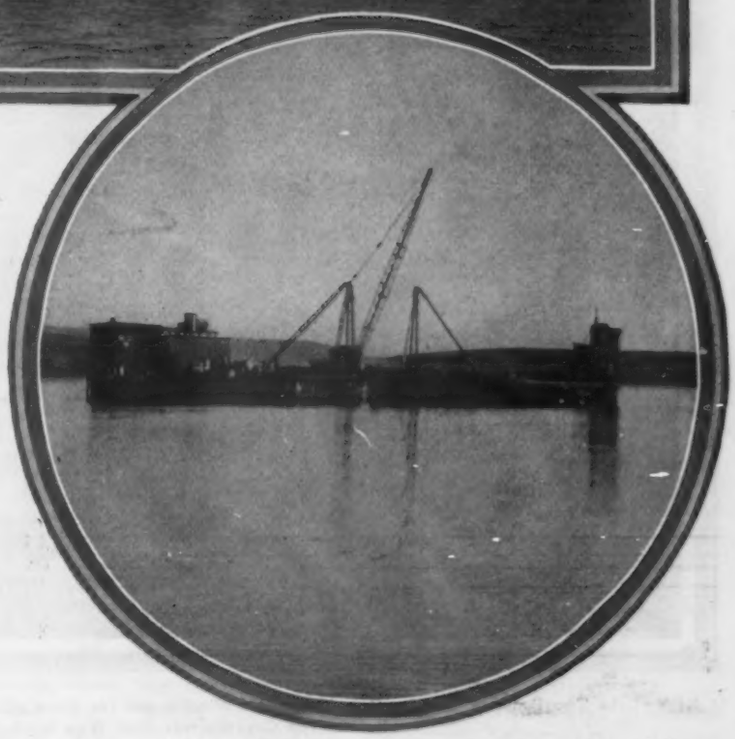
Were it possible to attribute to an inanimate thing the knowledge of its own destiny, to this dock might be attributed a foreknowledge of the work it was to attempt, judged by the difficulty experienced in getting it off the mud and afloat again. A fortnight of real, earnest and dogged striving, day and night as tide succeeded tide, saw the dock moving only inches nearer floating. Successfully in the end, however, but at the expense of three irrecoverable weeks of good weather in the spring, which could be ill afforded, the perseverance of tugs, winches and men in grim endeavor was rewarded and the dock was floated.

She was an awkward thing to tow 700 miles over the North Sea. Three tugs took charge of her and after an eight-day voyage she reached Scapa Flow in safety. Readers will probably know that Scapa Flow is that large stretch of water where are the Orkney Islands and which was one of the concentration points of the British fleet during the war—a wild and desolate part where the barrenness of the land is unrelieved by a single tree and the sea subject to tempestuous squalls.

The dock was not the slightest use for its purpose as one piece, but motives of safety on the voyage and economy in towing rendered the cutting of the dock into two parts necessary at Scapa Flow instead of at Queenborough. Cutting a steel structure into two is easy in the ordinary way, but a good deal of work had to be done under water. Finally this further stage in the alteration of the dock was completed. It was cut



THE Submarine Testing Cylinder Was Removed, as Was Also One Side Wall, and Along the New Face Were Fitted 6-in. Steel Shafting and 20 Hand Winches, as Indicated Above



AFTER Towing 700 Miles Over the North Sea to the Gale-Swept Scapa Flow, the Dock Was Cut Across Its Width, Requiring Under-Water Cutting, Transforming the Dock into Two Pontoons, Which Could Face Close to Each Other Over the Berth of the Sunken Vessel

across its width, not lengthwise, and two pontoons evolved.

It will be observed that the sides with the shafting and pulleys affixed were made to face each other, and each pontoon had its own set of 10 winches and 10 pairs of lifting blocks so that a cable could be pulled over each of the corresponding pulley-wheels. Three-inch thick studded wrought iron cable chain had been made fast to the blocks ready for passing over the pulleys when the pontoons were towed out from the firm's base at Lyness—an Admiralty depot during the war, taken over by Cox & Danks, Ltd.

The pontoons were moored over the destroyer V 70, one on each side of her position. By means of divers the lengths of heavy cable chain were passed over the pulleys on the one pontoon, under the hull of the sunken destroyer, up on the other side and over the corresponding pulley on the other pontoon, and of course made fast to the block. Ten lengths were passed under in this way. When it is remembered that each winch's direct lifting power was 10 tons and that the block multiplied the power by about 15 times, it is easy to calculate the capacity of the whole.

That "the strength of a chain is in its weakest link" Mr. Cox had not entirely overlooked; but these heavy chains were ready to hand from the firm's dreadnoughts and in a sense cost them nothing but their scrap value. That they might not be strong enough to withstand their heavy load was not disguised, but if they did, so much the better, and they were tried. The V 70 had been lifted 8 ft. from the bottom when number 10 chain cracked and then broke. The load was then on the others and one after another the chains snapped, broken links flying about the pontoons in an alarming manner. Fortunately there was no casualty.

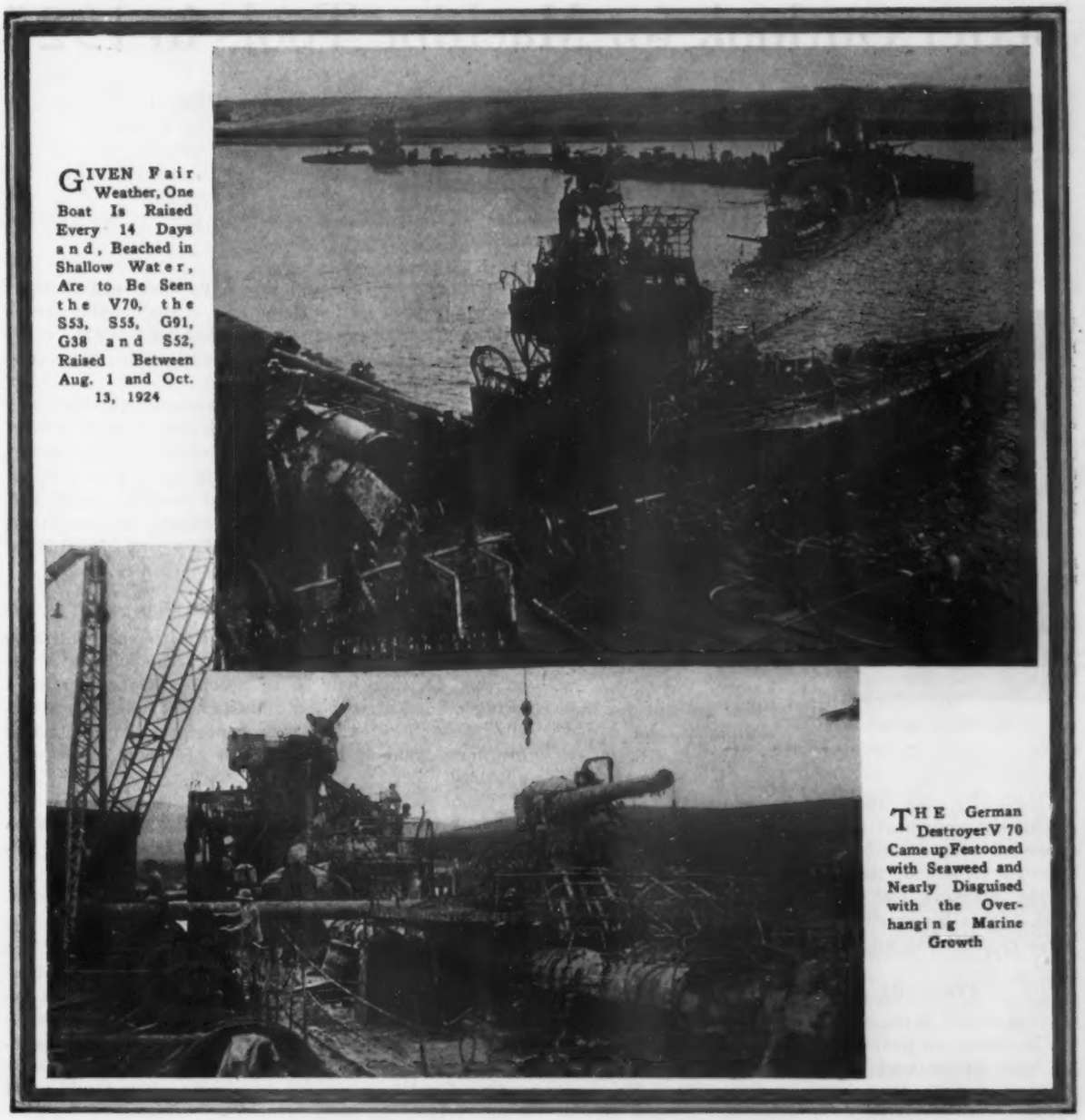
This first attempt was successful only in that it demonstrated that the ship could be lifted; and it was significant that three lengths of wire lifting rope which had been used with the cable chain stood the strain. The winches and blocks had also justified their special workmanship.

Nine-inch circumference flexible steel wire ropes were quickly brought into service and passed under the hull, the ship being tilted slightly to make this easier. In passing the ropes under it had to be remembered that the destroyer was considerably longer than the pontoons and that unless something like an even balance was obtained the result might be disastrous.

Everything was ready on the night of July 31, and the hours intervening before 4 a. m., Aug. 1, when the tide was dead low, were full of suspense and excitement for all concerned and particularly so for Mr. Cox, whose whole gigantic scheme was in a few hours to be proved either a success or a failure. It was no trifling thing to have gone so far and the cost up to that time was in the neighborhood of the equivalent of $150,000.

At 4 o'clock in the morning of Aug. 1 the winches were manned, taking spells of about 20 turns every few minutes. By fractions of inches and assisted by the rising tide the destroyer left its bed. The winding of the winches continued and the prize was feet from the bottom. The firm's own two tugs now took in tow the two pontoons with their captive, and commenced slowly to bring them to the shore. By noon the top hamper of the destroyer was showing and had been carried 2 miles to the sandy shore of Mill Bay. Success had been achieved in a truly wonderful way, not a hammer, not a spanner had been used during the whole time; it was just the steady winding of 80 men on 20 winches, and no hitch of any kind marred the morning's work. All the winding of the winches had, of course, produced a state of "chock-a-block" with the

Each of the Two Pontoons Has Its Own Set of Ten Winches and Ten Pairs of Lifting Blocks and, 3-in. Wrought Iron Cable Chain Failing, 9-in Circumference Steel Wire Ropes Were Substituted



GIVEN Fair Weather, One Boat Is Raised Every 14 Days and, Beached in Shallow Water, Are to Be Seen the V70, the S53, S55, G91, G38 and S52, Raised Between Aug. 1 and Oct. 13, 1924

THE German Destroyer V 70 Came up Festooned with Seaweed and Nearly Disguised with the Overhanging Marine Growth

pulley blocks, and the next operation was to take out lengths of surplus lifting rope and re-reeve the blocks so that a higher lift up the shore could be obtained and the vessel successfully beached and the pontoons cleared.

The V 70 presented a remarkable picture. Festooned with seaweed, her guns draped with pieces 20 and 30 ft. long and 3 to 4 in. thick; overhung with marine growth, she did not look very imposing as a ship of war. But she had been lifted out of 10 fathoms of water which had done their worst with her. So was the V 70 brought up on Aug. 1. Mr. Cox had estimated he would "get" one ship every 14 days, barring accidents and given good weather. One wreck had been salved; the scheme needed no perfecting, and it devolved into a case of mass production. The S 53 was raised on Aug. 13; the S 55 on Aug. 29; the G 91 on Sept. 12; the G 38 on Sept. 27; the S 52 on Oct. 13.

That fulfilment of the program brings us up to the time of writing. Bad weather is having its effect upon the progress of the work now, but right through the winter, at those times when it is at all possible, Cox & Danks, Ltd., will endeavor to pick up these destroyers until the spring brings quicker work. Some of them will be sold to other British shipbreakers, and some broken up by the firm at the shipbreaking depot it has established on the spot at Lyness.

Cox & Danks, Ltd., have now definitely bought outright from the Admiralty a total of 26 destroyers and the two battle cruisers—Hindenburg and Seydlitz. They expect to have the Hindenburg afloat early next year, all being well. This is an entirely different proposition with a part of her upper structure above the water at low tide, and the Sedylitz on her side. How these two will be brought up remains to be seen; the confidence of Mr. Cox is just as great concerning them as it was in the face of contrary opinion with the others.

In the final decision rendered by the Court of Appeals of the District of Columbia, relating to patent rights on alternating current transformer arc welders, it was decreed that Claude J. Holslag is sole inventor. The patent to him was issued on June 3, 1919, and was assigned to the Electric Arc Cutting & Welding Co., 152-58 Jeliff Avenue, Newark, N. J. The rights extend to welding from an alternating current transformer, no matter what its construction, and the right to license the use of such apparatus until 1936.

Steel furniture shipments in November are reported by the Department of Commerce at $1,410,362, compared with $1,472,902 in October and with $1,339,425 in November, 1923. The current figure represents about the average for the past 15 months.

Better Outlook for Machine Tools in 1925

Factors That Will Work for Greater Demand and Living Prices Include Western Development and Restricted Immigration

BY FRANK A. SCOTT*

FRANK A. SCOTT

THE machine tool industry has just come through another year of struggle against many difficult conditions, and will have but small profits to show for its labors.

The year 1924 opened with fair promise and the spring months developed an encouraging volume of business. Throughout the summer, however, and until after the results of the election were known, there was but little demand for new equipment and a very marked hesitancy in placing orders.

Naturally, the war left its aftermath of excess machinery equipment on the market and in the war-expanded plants; and the presence of this vast undigested volume of tools has been the cause of most of the machine tool manufacturers' problems since 1920. It is generally reported now, throughout the industry, that the end of this used tool market is in sight.

Prosperity Ahead with a Proviso

Coincident, then, with the appearance of a new era in American business—for the year 1925 promises no less—we witness also the disappearance of the greatest danger that ever overhung the American machine tool industry. On every hand there is evidence that 1925 will be a year notable in American business achievement; provided—and the proviso cannot be over-emphasized—provided industry and labor exercise self-restraint and avoid such increases in cost and price as might overload the business vehicle. The spirit of conservatism which has been inculcated by four years of liquidation and reconstruction must rule still if we wish to reap the most from the present opportunity.

The American railroads, after a good year in 1924, appear to be entering upon an even better year in 1925. Farming conditions unquestionably are better than a year ago. Here are two of the largest consuming groups in the country, quite evidently prepared to buy from the metal working industries. The producers of iron and steel, farm machinery, railroad and electrical equipment, automobiles and trucks, are going to reflect this condition in their activities. Building volume promises to be large and will influence plumbing supply, pipe, radiator and other similar lines. This all bears a promise of good business for the manufacturer of standard machine tools.

Changes in Demand

The automatic machines designed for special work, in certain lines, are less popular than they were. Many items of cost and loss have developed in their use which were not anticipated—so that highly developed standard machines, whether automatic, semi-automatic or hand, ride more securely today than they did four years ago.

European conditions have improved notably; and while indubitably foreign competition is more competent and greater in volume than before the war, nevertheless there has been a growing volume of foreign demand during 1924. American machine tools still hold the lead in design, workmanship, accuracy and productive ability. They cost more, and this higher price affords the foreigner his opportunity.

Bearing of Pittsburgh Plus

The decision in the Pittsburgh plus case will also advance the machine tool business. The natural result of this decision will be to accentuate the westward swing of metal working industry. The Chicago territory has been exceedingly important and productive for many years. Its importance is about to be emphasized.

From restricted immigration also the machine tool industry may expect help. Work must be done. What cannot be done by hand must be performed by machinery.

Better Outlook in Prices

So far as there was any general movement in the prices of machine tools in 1924, it was upward. The present conditions and the outlook would indicate that prices will trend upward. There is no reason to expect lower cost either of material or labor, and manufacturing organizations will be working at a disadvantage during the early part of any period of prosperity, for they have all been reduced and will need reinforcement as soon as volume increases.

It is perhaps a sad commentary that after 60 years of service to the metal working industry, such as no other country in the world has ever had, the American manufacturer of machine tools is still pleading with his customers to be allowed to charge enough to live and keep the industry in the way of advancement. The first cost of machine tools has been over-emphasized during this period of depression. They must be sold and purchased on the basis of return on investment; considering the cost of the engineering effort which goes into their design, no other basis would be fair. Too often the price is compared with that of a purely consumer product. A machine tool is a long-lived product, and its buyer should have no use for it at all unless he sees his way clear to make a profit on it over a term of years. The American machine tool has been a highly efficient, dependable, but too modest, servant. It is the master tool of industry, and it blushes every time the fact is mentioned.

The Scriptures contain a frightful story of seven lean years. The American machine tool manufacturer, remembering this, recalls that he has had but four. He almost hesitates to believe that the period of depression in his industry is over, and that he may look forward with confidence into 1925, although all the conditions observable in the business barometer seem to indicate this.

*President Warner & Swasey Co., Cleveland.

The conclusions reached by the author in the following analysis are:

1—We are recovering from a major business recession

2—Under the stimulus of easy money and inflationary tendencies, however, the recession has not been sufficiently prolonged to insure any great or long continued expansion

3—Prices and industrial output can hardly increase more than a few months before overproduction will be in evidence. Halting retail trade, on the one hand, and overcapacity in basic industries, on the other, make that probable

4—There is still a chance that the inflationary tendencies may make further headway and result in a boom, but at present this does not seem probable. The limited purchasing power of consumers and the caution of dealers seem likely to prevent the existing inflation in bank credit from developing into a speculative pyramiding

5—Money rates are firming and will soon advance; but are not likely to reach high levels in 1925

6—The first half of 1925 will probably be a fairly profitable period for most businesses, but the second half is still doubtful.

What 1925 Has in Store

Why First Half Promises to Be Fairly Profitable Though a Halting in Business Expansion May Come by February or March, Leaving Some Doubt as to Later Trend

BY LEWIS H. HANEY

THAT there is such a thing as the business cycle few economists deny. The assumption of recurring ups and down in industry is fundamental in business forecasting.

This does not, however, mean that the cyclical swings of business are uniform or regular. As a matter of fact, the periods of rise and of fall vary materially in length, and there is a wide difference in the heights of business peaks.

Just at present the cycle question is acute. Have we recently been at the bottom of a major business depression? Are we now in the course of an upswing in a major cycle? Will the upswing carry through for the most usual period—say twenty months to two years? These are vital questions.

To most observers it seems that business did touch the bottom of a cycle last summer. Clearly, industrial production and railroad tonnage reached a major peak about May, 1923, and after that fell off for a period of 13 months. The decline amounted to about 25 per cent. Both the period of decline and the amount of the recession are such as to conform to the conditions of the usual business cycle. Moreover, since June there has come a rebound in industrial activity which suggests the usual recovery. Many students of the cycle, therefore, are predicting a long continued upward trend in business.

Unfortunately, however, business cycles are not exact, and mechanical analogies and empirical reasoning are apt to break down. Above all, a careful examination of business data does not entirely support the optimistic conclusions of these observers.

Our Position in the Business Cycle

To begin with, the decline from the 1923 peak was far from sharp. It was broken by a false recovery in the early months of 1924, which was of considerable proportions. For instance, the average daily rate of steel ingot production in March, 1924, was actually higher than that of April, 1923. These facts have

DR. LEWIS H. HANEY is director of the New York University Bureau of Business Research. Formerly a professor of economics in the universities of Michigan and Texas, and author of books on "Business Organization," and "Railway Transportation" and "Economic Thought," Dr. Haney brings to his work of business analysis a thorough grounding in economic principles. During the war he was in charge of important cost finding work and advised the War Industries Board on price fixing. In the field of business research he has made a notable contribution in the discovery of a forecasting line which, during the last five years, he finds has, without fail, anticipated business trends by four to six months. During 1925 Dr. Haney and his bureau will contribute to THE IRON AGE *a weekly section on business trends and the iron and steel industry.*

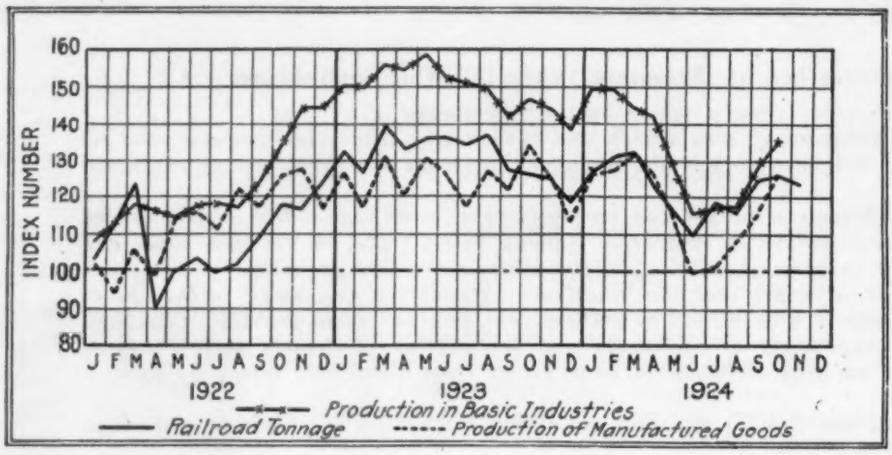


Fig. 1.—Trend of Production and Railroad Traffic in Recent Years. (The figures are index numbers based on the monthly average of 1921 as 100.) Note the peak in May, 1923, and the subsequent downward trend to June, 1924. The sharp gains at the end of the year are apparent. An important point is the sharper increase in production than in railroad traffic, which probably means a present tendency toward accumulation of stocks in first hands

tended to prevent a condition of drastic liquidation and depleted stocks which generally occurs during recession, and which is the occasion for subsequent recovery.

Furthermore, the upturn this fall has been unusually sharp. The bottom has been narrow. There has been no prolonged trough and irregularity. Production jumped from an index of 116 per cent of the 1921 average in June up to 136 per cent in October. This, again, suggests that the process of liquidation may not have been sufficiently thorough to lay a basis for a great and prolonged upswing.

In confirmation of this idea, attention may be called to data concerning stocks of commodities in first hands. Toward the end of this year commodity stocks increased and were less than 3 per cent under the high point reached in April. This condition differs materially from that at the bottom of the 1921 depression. In August, 1921, stocks of commodities reached a peak, as usual in depression, and then fell off with minor interruptions till May, 1923. But now we find stocks holding near their high level after five months of industrial upturn.

Stocks of pig iron at merchant furnaces have fallen from the peak of June 30, but are far greater than at the 1921 peak—perhaps 40 per cent greater.

Commodity stocks are a very sensitive index and the foregoing facts are not encouraging. They suggest greater limitations on industrial expansion than usually exist at the end of a major recession. They indicate the absence of any drastic liquidation.

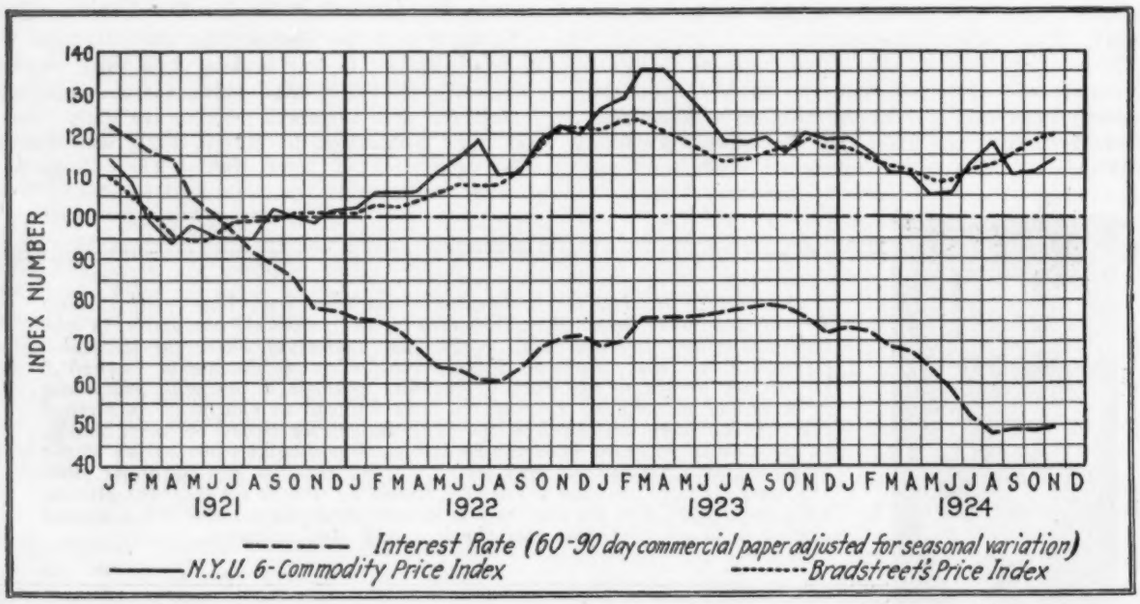
Finally, there is the fact that unfilled orders for basic commodities are in general relatively small, i.e., small in comparison with output. Take steel, for example. The unfilled orders for the United States Steel Corporation at the end of November were only about 32 times the average daily ingot production, while in November, 1921, they were 58 times the daily ingot production. Such a situation in varying degrees is too common in other industries. It suggests that the backlog of demand for supporting a boom is rather slender.

At this point the much talked of "hand-to-mouth buying" of the last year or two comes into the picture. Such buying cuts two ways. It holds back speculative operations but at the same time it keeps the dealer well up to his requirements. It prevents both excess stocks and deficient stocks. Probably there is little prospect of any great deferred buying. Rather the outlook is for continued caution.

Business Cycle Probably Shortened

It is probable that the period of the business cycle has become somewhat shorter. Caution and better information tend to keep business men close to shore, which in turn makes business ups and downs less violent and consequently shorter.

In a good many industries, too, the existence of over-capacity tends to make the swings shorter and sharper. In iron and steel, over-capacity is undoubted. Witness the sharp expansion in February and March, and again in August. Operating at about 76 per cent


INDEX NUMBER
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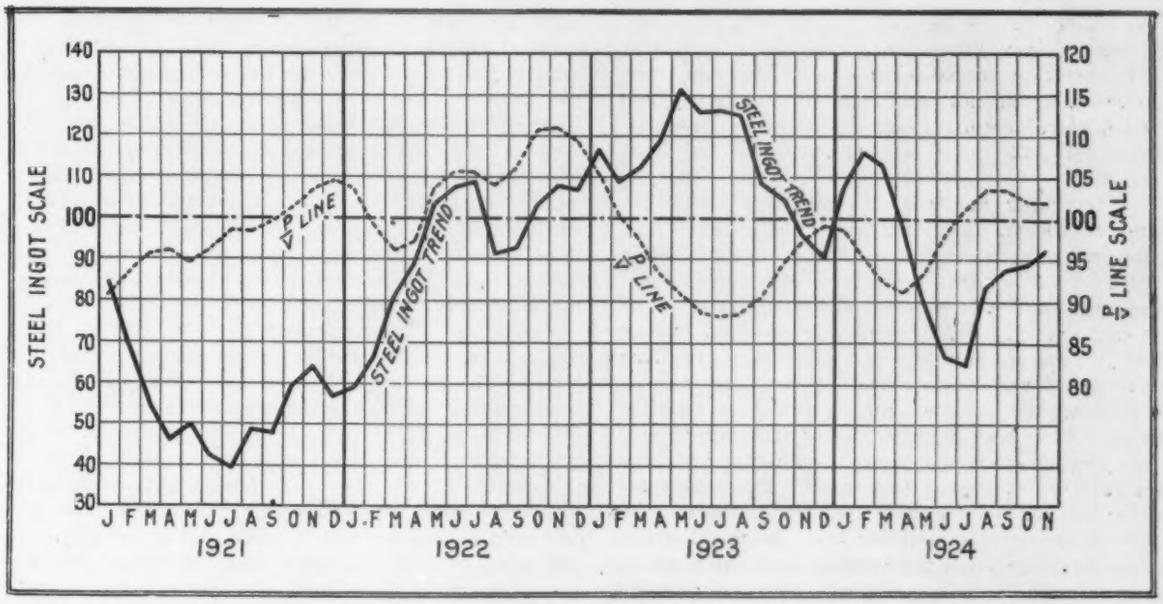
40
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1921
1922
1923
1924
Interest Rate (60-90 day commercial paper adjusted for seasonal variation)
N.Y.U. 6-Commodity Price Index
Bradstreet's Price Index

Fig. 2.—Trend of Wholesale Prices and the Interest Rate. The interest rate is now evidently about to follow prices upward


STEEL INGOT SCALE
P LINE SCALE
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STEEL INGOT TREND
P LINE
STEEL INGOT TREND
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N
1921
1922
1923
1924

Fig. 4.—The Dotted Curve Shows the Business Forecasting Line Which the Author Has Developed. That it accurately anticipates changes in steel ingot production is apparent. (The steel curve is adjusted for long-time trend and seasonal variation.) At the end of the year the forecasting line (which shows the ratio of commodity prices, *P*, and volume of commodities, *V*) indicates a halt in the current business expansion to come about next February or March, and leaves us in doubt as to the trend thereafter

of capacity, our steel works produce enough to satisfy all normal requirements of the national and foreign trade.

The foregoing reasons, and others to be mentioned, make it doubtful whether business in general, or the iron and steel industry in particular, should expect a long continued upswing to begin at this time. It seems more probable that expansion will continue at a fairly rapid rate during the early months of 1925, but that it will be checked rather early in the year.

The Demand for Basic Products

The demand outlook for basic products is only fair. Here the strongest features are: (1) better grain prices, (2) better railroad earnings, (3) recovery of certain laggard industries.

Owing to a world shortage, grain prices have undergone a phenomenal advance. At the same time, grain crops in the United States have been good, and our grain farmers have benefited largely, although by unusually heavy fall marketings they have not secured the full benefit. As a result farm debts in the grain sections have been largely liquidated, and an improved basis for rural demand in 1925 has been laid.

The railroad outlook is encouraging. Traffic has increased nearly 9 per cent since August (See Fig. 1), making due allowance for seasonal variation, and, with economical operation, net earnings have gained materially. While the carriers will earn less than 5 per cent in valuation for the year 1924, they have exceeded that rate considerably in the last few months and should show further gains. They have proved to be the strongest factor in the demand for iron and steel this year.

Equalization Among Industries and Prices

One of the strongest features in the general industrial outlook is the gradual recovery of a group of industries which did not share in the 1923 boom. That boom was supported chiefly by building activity and automobile demand. In 1925 it is not likely that we will see any such level of building as occurred in 1923 and 1924, and it is doubtful if automobile production will show much further expansion. But textiles, farm machinery, machine tools, leather, fertilizers, coal, copper, and oil have hardly recovered since 1921. Now the future of these industries is brighter. Each appears to have seen the worst, and in various degrees all are picking up. This should go a considerable way toward filling in the gap occasioned by the less favorable outlook for the building and automobile markets.

Apparently farm machinery producers are operat-

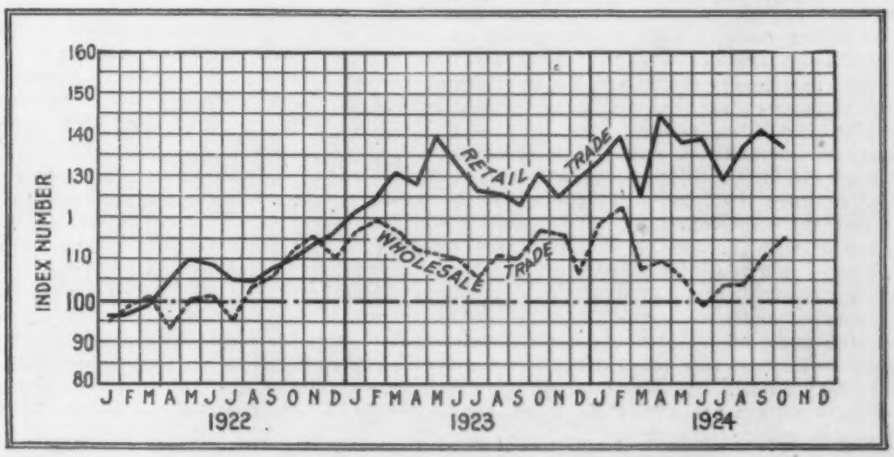


Fig. 3.—Trend of Domestic Trade. Both curves are adjusted for seasonal variation. Toward the end of 1924 wholesale trade was increasing more rapidly than retail trade

Right by Roberts L. Mulvena

ing at better than 60 per cent of capacity. The machine tool industry, after several poor years, is looking up. It therefore seems reasonable to conclude that, while some of the heaviest users of iron, steel, and other basic products, have only a moderately good outlook for 1925, the total demand should be at least normal.

The foregoing suggests another improvement in the general business situation which has occurred during the last year, namely, the trend toward equilization in prices. The general price level has recently advanced, the gain between July 1 and Dec. 1 being about 9 per cent (See Fig. 2), but perhaps the salient feature is that in general the prices of individual commodities have so moved as to bring them nearer to the average. The amount of divergence among prices of different commodities has been reduced. Cloths and clothing (the highest group) have come down, while chemicals and drugs (the lowest group) have risen. This makes for a better balance and for more uniform prosperity.

It may be noted in passing that the metal group has fallen further below the average of all commodities.

Fig. 2 shows how commodity prices in 1924 first fell and then advanced. On Dec. 1, the price average was higher than at any time since early 1923, when the long advance following the 1921 depression was checked by overproduction and banking policy. The interest rate lags the price trend by about six months, and is now evidently about to follow prices upward. The abnormally low level of money rates is clearly shown.

The Trade Outlook

In considering demand and prices the condition of trade should receive attention. Fig. 3 shows that toward the end of 1924 wholesale trade was increasing more rapidly than retail trade, which indicates that retailers in general were buying more heavily in comparison with their own sales. This reversed the earlier trends. The danger at the beginning of 1925 is that retailers will become overstocked.

Retail trade in 1924 has been disappointing. Its recent trend does not indicate any material growth in consumer demand, and supports the conclusion that consumer purchasing power is not gaining. (There is a larger factor of "normal growth" in the curve of retail trade, which explains why the curve lies so far above the wholesale trade curve in 1924).

As to foreign trade, during 1924 the trend of our merchandise imports was downward from February to August, followed by a sharp recovery. The general trend of exports was upward, and especially following July. The outstanding feature has been the heavy exports of grain and cotton, which have been unusually large in quantity. The high prices of these commodities have also swelled the value figures.

The United States being a creditor nation, the fundamental tendency is toward increased imports and a less "favorable" balance of merchandise trade. Thus far this tendency has been counteracted by the backwardness of European industrial conditions and the large foreign requirements of grain and cotton. During the next two or three years, however, the fundamental tendency must assert itself.

One of the big questions of the next few years is, How can a creditor nation export more than it imports? The thing does not seem possible for any extended period. Certainly the outlook for iron and steel exports is not bright. In 1924, our exports of semi-finished and finished steel have shown some tendency to decline. At the same time our imports of finished steel have been running considerably above the 1923 rate, and September and October imports of pig iron and scrap were much above those of 1923. Our exports have not been holding up to those of the leading foreign nations. Severe competition is in prospect.

Finance

It remains to mention the financial situation. Money has been abnormally easy during most of 1924, but it is hardly to be doubted that the bottom was reached in September and October. (See Fig. 2). Call loans are ruling firmer and commercial paper rates have advanced slightly. It is practically certain that interest rates will advance moderately during the first part of 1925. This conclusion follows from the upward trend of commodity prices, expanding industry, and contracting bank reserve ratios. There has come a turn in the net flow of gold to this country and increased exports of gold suggest that in 1925 our excessive holdings will be diminished. Also, of late, reserve bank deposits have shown a tendency to decrease, at least in relation to loans and discounts.

So enormous is our gold stock, however, and so moderate is the business expansion in sight, that no high level of interest rates seems likely to be reached next year. The resources of the Federal Reserve System are being little used by the member banks.

The sharp recession which occurred in steel production during 1924, and the almost equally sharp recovery, are shown in Fig. 4, together with the course of a curve which anticipates changes in the business cycle by four to six months.

New Extension Courses in Iron and Steel at Carnegie Institute of Technology

Further developments in the policy to extend its educational facilities wherever there is a need are indicated in a report from Carnegie Institute of Technology showing that two additional extension courses for iron and steel makers have been established this year in communities outside of Pittsburgh. Both courses are on "The Principles of Iron and Steel Making," and are given one night a week for 26 weeks.

One is being conducted in Woodlawn, Pa., in cooperation with the Jones & Laughlin Steel Corporation. The other is given in Midland, Pa., in cooperation with the Pittsburgh Crucible Steel Co. In each instance, the course has been instituted for the special benefit of the iron and steel workers employed in the cooperating plants, although any others interested in taking the work may enroll.

Both courses are similar in substance to the first extension course offered last year at Tarentum, Pa., in cooperation with several steel companies operating plants in that community. The classes consist chiefly of lectures, followed by informal discussions, covering the following topics; historical review, elements of chemistry and physics, blast furnace, pig iron, gray iron castings, malleable castings, wrought iron, crucible steel process, Bessemer processes, acid and basic, open-hearth processes, acid and basic, Talbot, Monell, and other special processes, duplex process, electric furnaces, steel castings, ingots and their peculiarities.

Both courses are being conducted by the department of mining and metallurgical engineering, of which Prof. Fred Crabtree is the head. According to the report, the enrollment in each class is about 25 students.

Charles M. Schwab, chairman Bethlehem Steel Corporation, and Otto H. Kahn, New York, have been elected to the committee of trustees of the Carnegie Institute, according to an announcement from Dr. Thomas S. Baker, president of the institution. Other new elections to the committee this year include E. M. Herr, president of the Westinghouse Electric & Mfg. Co.; Frank B. Jewett, vice-president of the Western Electric Co. and J. C. Hobbs, of Painesville, Ohio, the first alumnus of the institution to be appointed.

Reproduction by THE IRON AGE *of the pastel painting "Stripping Molds from Ingots," made in a steel plant at night by Roderick D. MacKenzie*

"Everything Gets Back to the Ingot"

(See following page)

"Everything Gets Back to the Ingot"

ON his office wall at 71 Broadway, New York, President James A. Farrell of the United States Steel Corporation has a photograph which no doubt has served to point many a conversation with those who have discussed with him there the problems of the industry. It is reproduced on this page. Hanging just back of the president as he sits at his desk, it is in full view of the visitor, and attention is readily drawn to it by the legend a draftsman has inked in: "Everything Gets Back to the Ingot."

Since the ingot is back of every calculation in the steel industry, whether quantitative or qualitative, or of whatever sort, it naturally has held the pivotal place in all the planning that has marked the evolution of Steel Corporation capacity from 9,500,000 tons at the beginning in 1901 to roundly 23,000,000 tons 23 years later.

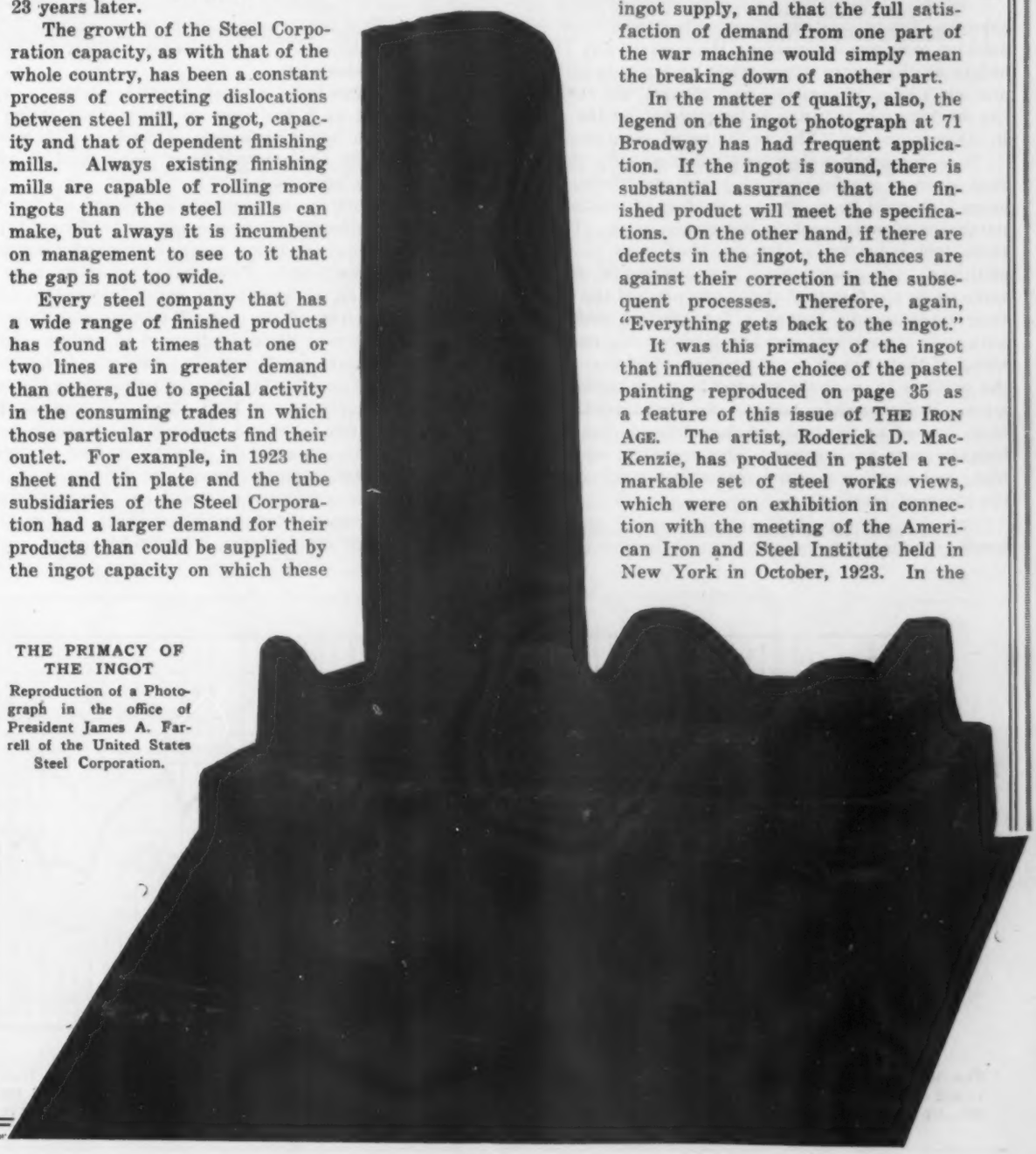
The growth of the Steel Corporation capacity, as with that of the whole country, has been a constant process of correcting dislocations between steel mill, or ingot, capacity and that of dependent finishing mills. Always existing finishing mills are capable of rolling more ingots than the steel mills can make, but always it is incumbent on management to see to it that the gap is not too wide.

Every steel company that has a wide range of finished products has found at times that one or two lines are in greater demand than others, due to special activity in the consuming trades in which those particular products find their outlet. For example, in 1923 the sheet and tin plate and the tube subsidiaries of the Steel Corporation had a larger demand for their products than could be supplied by the ingot capacity on which these companies ordinarily draw. To have put more of the corporation's ingot capacity at their disposal would have caused a shortage of steel in other departments—bar, structural and wire mills, for example. The result was the purchase of outside steel for the two companies that were under special pressure.

In war time, the problems of the director of steel supply at Washington and of the cooperating committee of steel manufacturers often reached an acute stage by the coming in simultaneously of greatly increased requisitions for ship plates, shell steel, rails, barb wire and structural shapes. The final apportionment was made only after protracted argument, in which the point was labored again and again by the steel distribution committee, of which Mr. Farrell was chairman, that no magic could create ingot supply, and that the full satisfaction of demand from one part of the war machine would simply mean the breaking down of another part.

In the matter of quality, also, the legend on the ingot photograph at 71 Broadway has had frequent application. If the ingot is sound, there is substantial assurance that the finished product will meet the specifications. On the other hand, if there are defects in the ingot, the chances are against their correction in the subsequent processes. Therefore, again, "Everything gets back to the ingot."

It was this primacy of the ingot that influenced the choice of the pastel painting reproduced on page 35 as a feature of this issue of THE IRON AGE. The artist, Roderick D. MacKenzie, has produced in pastel a remarkable set of steel works views, which were on exhibition in connection with the meeting of the American Iron and Steel Institute held in New York in October, 1923. In the



THE PRIMACY OF THE INGOT

Reproduction of a Photograph in the office of President James A. Farrell of the United States Steel Corporation.

43 pictures Mr. MacKenzie painted, dealing with iron and steel works, the dominant purpose was the portrayal of the spirit of flame and heat and its control by the ingenuity of man. Mr. MacKenzie spent the whole of every night in a period of two weeks in the steel plant in which he painted his "Stripping the Ingots." As column after column of the orange-hot ingots were being stripped of their molds, the artist tells us that he studied and portrayed "the effect of the vibrating heat in the form of vibrating color that radiated from them, and the last two nights were given to the discovery of just two final shades of color necessary to complete the effect."

It was remarked by visitors to the collection as shown in New York that this ingot pastel gave them well-nigh the sensation of heat. Similarly in respect to his handling of color, for the light effect, a sincere tribute was paid to the artist by one of the workmen in the steel plant who said as he looked at the finished picture, "How would it look in the dark?"

Prospects for Machine Tools in 1925

Few Large Industries Make Equipment Purchases at Proper Time—Some Machines Do Work in One-Fourth the Time of Five Years Ago

BY E. F. DUBRUL*

THE current business cycle is working out for the machine tool industry about as usual. In other words, other industries have revived to a considerable extent, and while some few wise buyers of machine tools are anticipating their wants and placing orders at the proper time, while material is still low, and while labor is available and efficient, the revival in the machine tool industry is lagging behind the revival in other industries. This is the usual experience.

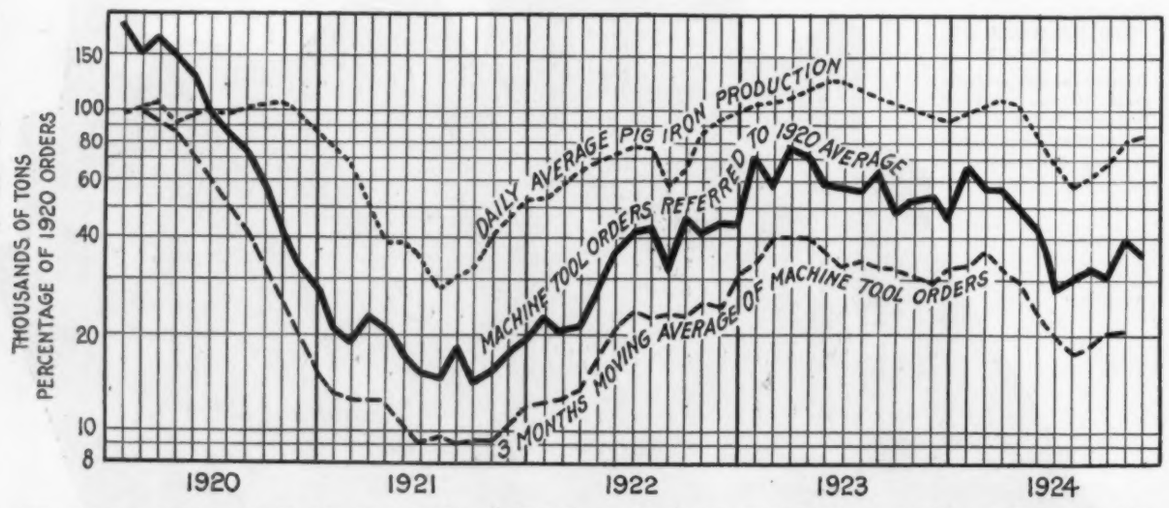
It is remarkable that with all the study that has been given to the business cycle and its effects, so few large industries have seen the wisdom of making their purchases of equipment at the proper time. The machine tool industry is always called upon to furnish additional equipment when its customers suddenly wake up to the fact that they have reached the limit of their labor supply, though a few efficient competitors anticipate their wants and buy labor saving machinery ahead of that time. Then the machine tool users call on the builders to go to the rescue with much needed equipment. Unfortunately, however, by that time the users have cleaned up the labor market; labor is less efficient because there are so many jobs available, material is high, and there is a grand scramble for everything in the shape of supplies.

In the course of time this policy of deferring purchases to the last minute has compelled the machine tool industry to provide peak-load facilities, and naturally the buyers of machine tools have to pay a price that covers the cost of any idleness waiting for their demand to materialize.

All the signs point to such demand coming on during 1925, just as it has come on every other period of activity. If a few large buyers of machine tools would only anticipate their wants they would find it very much to their advantage.

The demand in the approaching period of activity will naturally be for the newer and more efficient types of machines that the industry has been developing during the last few years. There have been very many of these machines, in practically every group, touching every subdivision of the art of cutting and forming metal and showing decided advances in design. Some machine tools are so efficient that they are doing work in as little as one-fourth the time required on the machines of the vintage of 1920. It is astonishing that with this greatly increased efficiency the larger buyers, who would be expected to have their own interests keenly at heart, have not acted any differently in the way of placing orders than heretofore. They are waiting for the boom to overtake them. When it does, they will wish they had ordered long before.

*General manager National Machine Tool Builders' Association, Cincinnati.



The Moving Average of Machine Tool Orders Is Based on 100 for the First Quarter of 1920 and Therefore Lies Lower in the Diagram Than the Curve of Orders on All of 1920 as a Basis. The moving average curve, used by Mr. DuBrul, irons out month by month fluctuations in making comparisons with the pig iron production curve

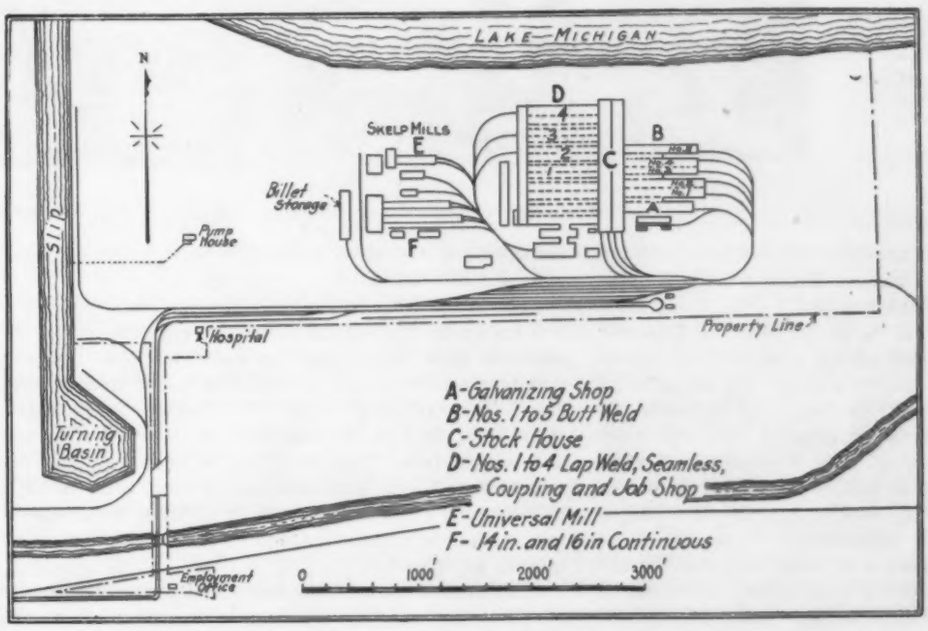
The Airplane Photograph Shows Under Construction in the Foreground the Billet Storage and the Skelp Mills, Beyond Them the Pipe Mills with Stock and Shipping Building in Between and at Right Foreground the Edge of the Coke Plant of the Illinois Steel Co.

First Units of Gary Tube Company

Lap- and Buttweld Pipe Mills End on Opposite Sides of Central Stock and Shipping Building— Continuous Skelp Mills

BY GEORGE F. TEGAN

THE National Tube Co. will soon be producing pipe in the Chicago district, since its subsidiary company, the Gary Tube Co., has practically completed its pipe mill, the first leg of the journey toward a complete works capable of producing pipe from the reducing of the iron ore to the finishing operations of pipe making. National Tube Co. officials and engineers in charge of new construction never have been known to act as though they thought the world was built in a day and in its newest plant there is ample evidence of deliberation in engineering and a reflection of the fact that the company is building for the future. Coincident with the construction of the pipe mill the company has been building homes for employees and the



Pipe Mills of Gary Tube Co. Are at Eastern End of Property, Leaving Space Toward the West for Blast Furnaces and Steel Making Plant

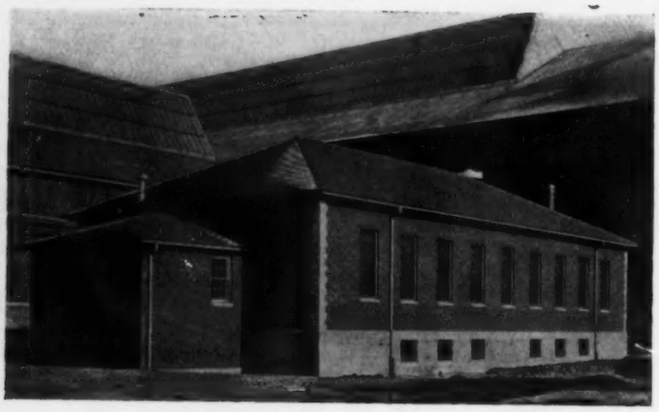
electric street railroad has been extended to the plant, and through a system of subways it is possible for the men to reach their positions without being exposed to the weather or the dangers that lurk in the open spaces around steel plants. There is a thoroughness to engineering details, whether it concerns the mills, or the homes of the employees, or the shelters which have been provided at the car stops.

The new plant, which is located in Gary near the are strung out at Lorain, they abut on opposite sides of the central stockhouse and shipping building at Gary. This arrangement makes possible the loading of cars with buttweld, lapweld or seamless pipe without the necessity of shuffling them.

The pipe mill of the Gary Tube Co. is located near the eastern end of the company's property, thus leaving space for the other units of the complete works, comprising skelp mills, three of which are now under

The Single Structure Is a Four-Family Residence for Employees

Below Is the Building Accommodating the Plant Cafeteria Restaurant



Shelter Houses Are Provided at the Stopping Places of the Electric Street Car Line

At the Right Is One of the Rows of Single-Family Employee Residences

by-product coke plant of the Illinois Steel Co., between Lake Michigan and the Calumet River, will be capable when running full of producing 34,000 tons a month of butt and lapwelded pipe of ⅜ in. to 20 in. in diameter and seamless drill pipe and casing 4 in. to 12 in. diameter. This means that roughly the present capacity of the National Tube Co. will be increased by about 30 per cent. Until the company becomes self contained through the construction of blast furnaces and steel works, the steel to be used will be furnished from one of the works of the Illinois Steel Co., and other United States Steel Corporation subsidiary.

The Gary unit has been compared with the Lorain plant of the National Tube Co. in layout, but there is one essential detail in which the new plant differs, and that is that, while the lapweld and buttweld furnaces construction, and steel works and blast furnaces, which will be built later.

The various units making up this plant consist of five buttweld pipe mills, four lapweld pipe mills, one seamless pipe mill, coupling shop, job shop, machine and blacksmith shops, galvanizing plant and accessories. The buttweld mills will produce pipe ranging from ⅜ in. to 3 in. in diameter; the lapweld mills pipe and casing from 2 in. to 20 in. in diameter; and the seamless mill drill pipe and casing from 4 in. to 12 in. in diameter. The rated capacity of these units operating in full is approximately 34,000 tons of pipe per month, as stated.

The roofed area of the mills and shops is in excess of 33 acres and the buildings are connected so that access may be had to practically all portions of the

plant without getting from under cover. The unique feature of the layout is the central stockhouse and shipping building to which the finished product moves without cross or counter currents in the flow of material from the point of entry of the raw material. This building is 220 ft. in width by 1200 ft. in length, running north and south. The pipe mills and shops extend to the east and west, the lap mills, seamless mill, coupling and job shops being on the west side and the butt mills and galvanizing shop on the east side. This is a very compact arrangement, resulting in a minimum handling of material.

The group of buildings occupies a quadrangle approximately 1300 x 1700 ft. The buildings housing the two large lapweld mills and the seamless mill are each 128 ft. wide by 648 ft. long, while the two small lapweld mill buildings are each 112 ft. by 648 ft. A skelp storage building 88 ft. 6 in. by 1032 ft. long parallels the stockhouse building on the furnace end of the lap mill group of buildings. Of the five buttweld mill buildings, three are 64 x 672 ft. and two are 80 x 744 ft. in plan.

In order that the plant may be reached with ease and safety the entrance arrangements have been carefully worked out and provide a roadway and street railroad extension north from Virginia Street to the southern boundary of the company's property, thence east to the pipe mills; there is a bridge over the Calumet River, and a subway under the railroad tracks of the Chicago, Indiana & Southern Railroad. An employment office and watchman's station is located at the Virginia Street entrance. At the pipe mills the roadway is depressed and passes under the street railway and railroad track into the mill yard. Shelter houses are built here along the street railroad tracks for the protection of waiting passengers against the elements. From these shelter houses, passage ways lead to the subway through which the road passes and the office, mills, and shops can be reached from it by means of underground walks and thoroughfares.

A restaurant operating on the cafeteria plan is located at the pipe mills to enable employees to obtain hot, wholesome and substantial food at a minimum cost and with the assurance that the interest of the employees and not profit is the governing factor in its operation.

An emergency hospital with the usual facilities and equipment has been provided for rendering first aid to the injured and for taking care of minor injuries and sudden illness. A trained nurse, under the direction of a doctor, is constantly in attendance. This hospital is located at the north end of the roadway from Virginia Street.

There is also under construction at this time one 14-in. continuous skelp mill, one 16-in. continuous skelp mill and a 42-in. universal mill to roll the plates required for the various sizes of pipe.

In order to house employees properly, a group of 286 dwelling houses is being erected. The bulk of these are located on the east side of Gary within walking distance of the main entrance of the plant. The dwellings are of an attractive and substantial character, and contain four to six rooms each, and are erected on lots 40 x 125 ft. located on paved streets.

The houses are being rented to employees on a reasonable basis, but it is the intention of the Gary Tube Co. to encourage employees to purchase them under the home owning plan inaugurated by the United States Steel Corporation which permits the employee to acquire a dwelling house upon a small initial payment followed by monthly installments, the deferred balance bearing interest at the rate of 5 per cent per annum.

Seventy of these dwellings have been completed and are now occupied, 113 are nearing completion, and contracts are being placed at the present time for 103 additional ones.

The clearing of the site, general grading, excavations, and concrete work for building columns, subways, sewers, conduits, furnace tubs, and other work of this nature was done by the Mellon Construction Co. The mill and shop buildings, complete, including structural steel work, masonry and sheet steel walls, roofs, and roofing, steel sash and glazing, etc., were constructed by and under the supervision of the American Bridge Co. All stacks are made of hammer welded pipe and were fabricated at the Christy Park Works of the National Tube Co. and erected by the American Bridge Co. The bending, welding, and heating furnaces are built in monolithic concrete tubs.

The official personnel of the plant is: F. W. Waterman, manager; Thomas Patterson, superintendent; William Bark, assistant superintendent, and George A. Passmore, chief clerk. Approximately 2300 men will be employed in the pipe mills and auxiliary shops.

Twenty-five Years of Progress in Mechanical Equipment for Foundries*

BY G. P. FISHER

THE art of making castings is one of the oldest mechanical arts, dating back to the very beginning of civilization. Yet the basic principle of pouring the molten metal into a form or mold is essentially the same today as it was centuries ago. While progress was made from time to time, the greatest changes have taken place during the past twenty-five years. This period has witnessed the introduction of many important mechanical devices, such as molding machines, electric cranes, conveyors, trolley systems and other labor-saving equipment, which have made possible quantity production on a scale never dreamed of.

One of the most outstanding features is the almost universal application of material handling machinery; this includes cranes of various kinds, overhead trolley systems, conveying systems, electric tructractors, air hoists, elevators, etc. While some of these things were in use before 1900, their application was limited and the designs of that day were crude and entirely unfit for present day requirements. Foundry operation involves an enormous amount of material handling, some authorities claiming that the production of a single ton of castings involves work equivalent to handling 168 tons of material. It is evident, therefore, that the wide use of material handling machinery accounts for enormous savings in time and labor.

Another important feature is the improvement in methods and equipment for handling sand before and

*The author, who is foundry superintendent, Whiting Corporation, Harvey, Ill., recently discussed the question of progress in the foundry before the Chicago Foundrymen's Club.

after molding. In most foundries the shoveling gang has been replaced by mechanical conditioning equipment, such as power-operated sand mixing, screening and cutting machines, conveyors and storage bins for handling prepared sand to the molding floors, etc.

As to the actual process of molding itself, the development of a varied line of molding machinery is perhaps the most notable achievement—without which it would be impossible to manufacture on the vast scale of quantity production as practiced in our modern automotive foundries. Twenty-five years ago the molding machine, like the automobile, was given little serious consideration; today it is a practical necessity in many shops.

In the preparation of cores we also see much improvement. Formerly all cores were made by hand and baked in more or less crude types of ovens. Today we see very efficient core-making machines and a variety of scientific ovens (operated by gas, powdered coal, fuel oil or electricity) covering all conditions of work; besides the stationary ovens for large work (designed for cars or racks), we also have small portable ovens and drawer type ovens particularly adapted for handling small work and hurry-up jobs. Rod straightening machines are also an important item in the proper operation of the modern core-room.

Handling Charges in Melting Department

When we come to the melting department, the greatest improvement is in the mechanical handling of the charges. The selection of equipment for this department depends largely on the tonnage handled, but there is no installation so small that it cannot profit by simple handling equipment. In the larger foundries it is usually desirable to have an electric traveling crane in the yard for unloading scrap and pig iron, also supplies and delivering to the storage piles. This saves an enormous amount of labor.

Charges are made up on cars in the yard and transferred by an electric truck to the cupola house, where elevators carry the charging cars to the charging platform. An ideal arrangement is to have the charging floor so arranged with a suitable track system that there is a continuous movement of loaded cars to the cupolas and a return of the empties to the yard for reloading. Power-operated machines for dumping the charges into the cupolas are proving very valuable and effect remarkable savings in labor.

The utility of cranes and other carrying equipment has already been mentioned. Their use extends to all departments, including the distribution of hot metal from the cupola to the molds. The modern electric traveling crane affords a delicacy of control, permitting the greatest care in drawing patterns, closing flasks and pouring molds. Much improvement has also been made in the design and construction of ladles. Designs are now on the market which are absolutely self-locking and yet easy to operate. Ladles of this type are not only a big advantage from the mechanical point of view but a decided advance toward "safety first."

The Modern Cleaning Department

In the cleaning department we also see much progress. The crude stave non-exhaust barrels have been largely replaced by the steel-plate exhaust type of mills equipped with dust-controlling systems so that the modern mill room is no longer the suffocating dust room of former days. Sandblasting machinery is a relatively recent development of great benefit to the cleaning department, resulting in better cleaned castings and reduced labor. Another mechanical device of great value to the cleaning department is the oxy-acetylene welding torch for cutting risers and gates and for remedying cracks and defects in castings after cleaning.

In these days of high-priced materials it is usually profitable to recover the iron and coke from the cupola dump by the use of cinder mills. In brass departments a magnetic separator performs a similar duty.

Within the past few years equipment for burning pulverized coal has been developed to a high degree of efficiency, making it a most economical method of firing annealing ovens, air furnaces, core and drying ovens and boilers. In the malleable foundry especially has pulverized fuel achieved notable success. Some of the powdered coal systems now on the market are practically automatic in operation, dispensing with an enormous amount of hand labor and producing more uniform results.

Progress in General Sanitation

In keeping with the mechanical progress, briefly mentioned above, there has been a steady improvement in sanitary features. Living conditions in the old foundries were almost unbearable. During the past 25 years more attention has been paid to the human side of industry, resulting in better ventilated buildings, sanitary washrooms, dust-free cleaning rooms and more tidy conditions all around. It is no exaggeration to say that some of the more up-to-date plants, as for instance the Ford Motor Co.'s enormous foundry at River Rouge, are as clean as the workingman's home.

As to the future development of foundries, it is difficult to predict what conditions will be twenty-five years hence. We are only beginning to learn something about electricity and what it can do for mankind. The improbable dream of today is likely to be the reality of tomorrow. Who knows but the cost of electricity 25 years from now will be such as to permit the use of electric furnaces for all melting purposes? Undoubtedly the greatest improvement of the future will be the wider application of electrical devices to all phases of foundry operation.

Fire Prevention to Be Discussed at Mid-West Safety Conference

A session devoted to fire prevention will be a feature of the annual Mid-West Safety Conference to be held under the auspices of the National Safety Council at the Hotel La Salle, Chicago, Jan. 19. Among other addresses there will be one on the use and characteristics of small fire extinguishers, and another on chemical engines and fire hose.

A symposium on safety kinks, safety equipment and educational stunts, at the afternoon session, will be illustrated by exhibits and slides. T. H. McKenney, Illinois Steel Co., Chicago; T. Meisner, American Can Co., Maywood, Ill.; and H. D. Herron, International Harvester Co., Chicago, will be among those taking part in the discussions and demonstrations. There will also be an address on the dollar side of safety. W. E. Worth, International Harvester Co., will preside.

George Hodge, International Harvester Co., will be toastmaster at the evening dinner meeting, at which the Fairbanks, Morse & Co. quartet and others will provide entertainment. There will also be addresses on industrial safety and on building men for safety.

Gas Products Association Convention

The Gas Products Association, the trade association of the oxy-acetylene industry, composed of producers of oxygen, hydrogen and acetylene gases, carbide, welding and cutting apparatus and supplies, will hold its eleventh mid-winter convention at the Hotel Sherman, Chicago, Jan. 22, 23 and 24, 1925. The convention will close with a banquet on Saturday evening, Jan. 25.

The executive offices of the association are at 140 South Dearborn Street, Chicago, and Charles T. Allen is secretary and treasurer.

Simplification Greatly Benefits Industries

Elimination of Waste of Iron and Steel Reduces Costs and Brings Many Other Highly Desirable Results

BY ERNEST L. PRIEST*

THE United States produces 64 per cent of the world's steel and consumes 57 per cent. We produce 54 per cent of the world's iron, and consume 53 per cent. And while we have the greatest natural resources of any nation and are today the foremost industrial nation, our industries are facing the fact that to retain this leadership and still maintain the American standard of living we must find means of getting a greater maximum return from our raw materials and industrial effort. The iron and steel industries have not been unaware of this condition.

The elimination of waste in American industry is often beyond the ability of the individual manufacturer—they are wastes imposed by competition, by custom, and can only be remedied by cooperation of all manufacturers and the cooperation of the consumer. That is the service which the Department of Commerce has offered—when the trades request its service to call the representative men together and go after the leaks in collective waste by cooperative action.

Numerous groups in the iron and steel industries have found their efforts given unqualified support and indorsement by the first line of consumer group, in these problems of eliminating waste. The Metal Branch of the National Hardware Association of the United States, the American Hardware Manufacturers Association, the National Association of Purchasing Agents, organizations of hardware jobbers and retailers, and other bodies have joined forces with them in their effort.

The major attack in these cases on waste is through simplification of dimensions and sizes. The extent of the simplifications adopted in general conferences, in cooperating with the department by manufacturers, distributors and consumers, as applied to the iron and steel industries can best be realized by their actual record:

Commodity	No. Items Shown in Surveys	Reduced to
Sheet steel	1819	263
Woven wire fence	552	69
Metal lath	125	24
Range boilers	130	13
Files and rasps	1351	496
Forged tools	665	351
Beds and springs	78	4
Bolts and nuts for farm equipment	1500	840
Hot water storage tanks	120	14
Steel lockers	65	17
Steel barrels and drums	66	24
Steel reinforcing bars	40	11
	Weight	Weight
Terne plate	9	7
Eaves trough—conductor pipe	21	16

This list, however, does not include the sweeping reductions made in the class of builders' hardware, in which there was a slash of 71 per cent in the variety of finishes and 7000 catalog items. Nor does it include the group of simplifications which are now being presented to the groups in the marine field for indorsement and adoption.

But to go back to the results of simplification. It is only fair to state that many individual companies have applied this method without resorting to group action and without seeking the cooperation of the department. Typical comments from those who have achieved simplified practice either as individuals or as parties to group action may sound like an old-fashioned "experience meeting," but one must remember that it is a group of hard-headed business men talking—men who don't let themselves be carried away with an idea, who withhold their expressions until they have been "shown."

Again, to consider the field of transportation, so closely interlinked with the iron and steel industries: Simplified practice, as fostered by the Department of Commerce, was applied by one great system to the things it bought—for the plan works as well for buyer as for producer or seller. This system reduced the variety of items carried by its stores department from 140,000 to 78,000, a cut of 44 per cent. And purchasing agents of a group of railroads cut their service stocks from six to three months' supply, and at the same time saved $180,000,000, or 37 per cent.

In freight car construction, 187 varieties of axles, journal boxes, couplers, brake shoes and brake heads have been cut to nine, and further studies are being made now by the American Railway Association.

(*Concluded on page* 88)

Comments by Business Men as to Results of Simplification

"WE reduced our catalog from 17,000 *to* 610 *items."*

"Simplification made it profitable for us to reduce our line 80 *per cent."*

*"What simplification has done for us—*25 *per cent increased sales,* 30 *per cent lower costs, full production the year round."*

"Larger volume, lower costs, with 6 *items instead of* 1600."

"We are getting 25 *per cent more this year from our payroll."*

"Simplification cut our costs 12 *per cent, increased production* 50 *per cent, reduced seconds* 91 *per cent."*

"Thirty-five per cent lower prices, 25 *per cent smaller inventory, doubled sales through simplification."*

"Twenty times the volume of business since simplification."

"Our business has grown 20 *fold since we adopted simplification."*

"We sell twice as much on half the stock."

"We increased our volume when we cut our line 60 *per cent.*

*Department of Commerce, Washington.

Preparedness to Save Money and Time

Army Industrial College Studying Procurement of Materials, Labor, Transportation and Power—Industry to Cooperate

BY L. W. MOFFETT

INVENTION and science move so rapidly that they bring about quick evolution throughout the multiplicity of activities they touch. Underlying principles upon which these activities rest may remain practically unchanged, but their direction and effectiveness often are completely altered and greatly intensified. Whether used in peace time for constructive effort or in wartime for defensive or offensive purposes, invention and science have reached out through all the channels of modern-day society and developed refinements that even a decade ago were mere dreams. War itself has become infinitely more than combatant man fighting man. It has been developed into an art, deadly as it may be, until it has almost attained the superlative degree.

Reaching this plane, it has laid its hands on a vast array of weapons so that today there is scarcely anything that comes from the earth, the mine, the mill, and even the retail shop, that is not a potential element of warfare. The evolution from primitive days to the present in the development and use of weapons to preserve life or to take life would, if charted, show a line not only devoid of angles but one that would reflect a progressive rise that would be striking to the human eye and mind. Perhaps sharpest of all departures in the upper trend of such a line would be during the period of the World War, and it has been rising rapidly since.

Particularly manifest has become the absolute necessity to any nation, if it is to defend itself successfully, to make the fullest possible use of its resources. The War Department quickly became aware of this fact, partly because of the amazing state of unpreparedness of the United States when it went into the World War and the losses of men, money and time that were suffered as a result. It was by reason of this that Congress, when it revised the National Defense Act in 1920, empowered the Assistant Secretary of War, among other things, to mobilize industry. The outlines for such a plan of mobilization have been well prepared and have been published in THE IRON AGE.

Industrial College Established

But going further than mere physical preparedness, the War Department has developed a plan of industrial strategy. With this end in view it established, on Feb. 25 last, an Army Industrial College in the Munitions Building in Washington, which is to train student officers of the seven supply branches of the department in the economics of industry and to give instruction in the best and quickest way to secure the myriad of supplies, to transport them and most effectively to use them at strategic points. Labor, transportation, power, price control of industrial and innumerable other subjects, all are included in the curriculum. The Industrial College is to a training in industry and its application to war precisely as the War College is in its training in military strategy.

In addition to the course of instruction at the college, authority has been granted by the Secretary of War for the detail of certain selected officers from the various supply branches of the Army to the Harvard School of Business Administration. Eight army officer students began this two-year course on Feb. 1, 1924. The Harvard school was designated for the purpose of educating these selected officers from the supply branches, so that they might develop a concentrated course in business administration to be made available in one manner or another to a large number of officers of the army. This school considers only peace time methods of administration, as distinguished from the training given to students in the Army Industrial College. It is believed that the education of army officers in general business administration will greatly increase the efficiency of procurement agencies. Col. H. B. Ferguson has been assigned as Director of the Army Industrial College, while Lieut. Col. G. E. Kumpe has been made Assistant Director and Major R. H. Somers, Executive Officer.

The first class of the Army Industrial College consisted of nine student officers who began their five-month course last February. The course embraces the following subjects, which broadly represent those that still are pursued:

(a) Mission of the office of the Assistant Secretary of War, the procurement mission of each of the supply branches, and means of accomplishing these missions.
(b) Critical study of World War records.
(c) Resources of the United States in material, facilities and possibilities.
(d) Strategic and critical materials.
(e) Principles of planning and management.

Studies Being Pursued

The curriculum of the college is extensive and among other things includes an orientation course of reading. This course includes historical matter, laws, such as the National Defense act, bearing upon the question of mobilization of industry, various works and reports that grew out of the World War, legislative hearings, special subjects pertaining to procurement, industrial organization and management which has been outlined to the War Department by practically all of the big industrial corporations of the United States, and many other topics vital to the matter of securing supplies and controlling industry during war time. The course also includes various problems to each of which one week or two weeks of study may be given.

There are such problems as labor—involving the general situation of labor that would confront the United States in the event of war, the manner of insuring adequate supply of labor for war industries to meet the increased load placed upon them, the assumption being that labor will not be drafted in the military sense of the word. Among other problems also are those relating to principles involving the computation of requirements which are applicable to all supply branches of the War Department. Such a problem takes into account the basis upon which requirements may be computed and the methods of operation, special factors affecting requirements, such as the necessity for accumulation of depot stocks, etc. Transportation and power obviously are among important studies being made. Tentative allocation of problems gives a wider view of studies being made.

Secretary of War John W. Weeks, at the formal opening of the Army Industrial College, pointed out that the World War demonstrated the practicability of selective service as a means of providing man-power in the event of war, but declared that the problem of feeding, clothing and equipping the Army had not been solved satisfactorily. Therefore, he pointed out, the War Department is endeavoring to prepare the nation industrially so that the munitions of war, food, clothing, transportation, etc., shall be supplied as expeditiously and efficiently as man-power. The Secretary declared that in case of war it is necessary to undertake active hostilities with as little delay as possible and endeavor to strike a disastrous blow before the

enemy is equally prepared. In this connection he added:

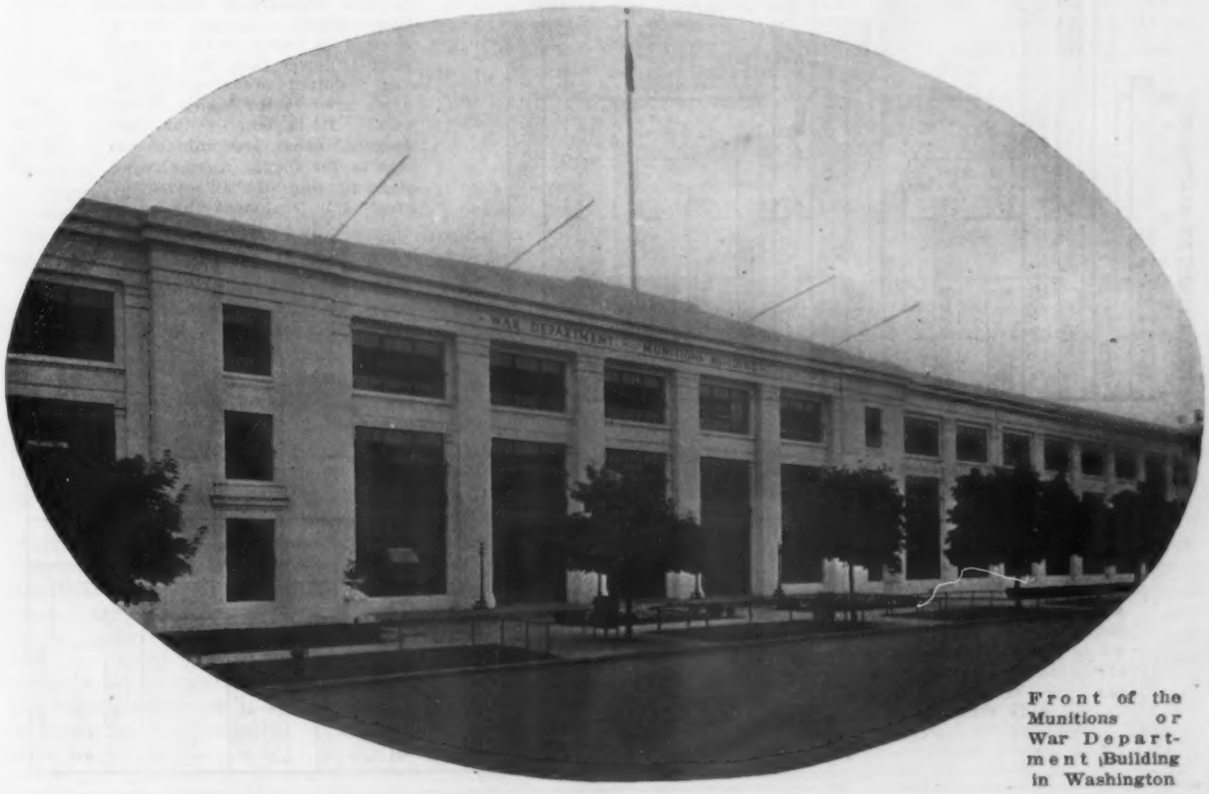
> "We have seen the value of the army service schools to the combatant branches of the military service, and we believe their usefulness demonstrates the need for a school which shall specialize on the supply problems of the Army. That is what we are inaugurating here this afternoon. We want to train officers in the supply branches in order to provide key men on every type of equipment needed by an army. Eventually all members of the supply branches should receive instruction in industrial subjects. That is our hope for this school. The school is more or less of an experiment, to be sure, but we believe the experiment will be successful and that the school will prove of great benefit to the nation. The responsibility of making the school a success depends largely upon men who are to be its first faculty and its first student body. In undertaking this work you are performing a patriotic service and I hope and believe you will devote yourselves to this duty with energy and intelligence and the determination to make this experiment an important permanent institution in the United States Army."

Assistant Secretary of War Dwight F. Davis dwelt upon the same points as those made by the Secretary, but amplified them somewhat. He emphasized the fact that the world is constantly developing industrially as well as along scientific and engineering lines and because of this the supply problem of the future will become inevitably more complex and vast.

What Is Expected to Be Accomplished

With the studies set up and the training it is giving officers, the Army Industrial College is expected to fit officers for the War Department's share of the task of mobilization and direction of the industrial power of the country, just as the War College fits officers to mobilize, train and direct the man power of the nation. It feels that, with a corps of industrially trained officers at the helm of the business activities of the Army, it will mean the assurance of a degree of military efficiency never before obtained. The uninterrupted flow of supplies is a problem so complex that it requires an especially developed personnel for its planning and administration. As pointed out by Mr. Davis, from the time iron ore, coal and manganese are taken out of the ground; from the time that the tree is felled and cotton is planted, until it all merges into a complete round of ammunition, there must be no cessation in the coordinated flow from raw material to the finished product. The Secretary added:

> "Experience in the late war demonstrated the desirability of decentralizing procurement, and turning over inspection and other details connected with procurement to local agencies which can keep in close touch with manufacturers. The United States is divided into fourteen procurement districts, with headquarters in Boston, Bridgeport, New York, Buffalo, Philadelphia, Baltimore, Birmingham, Pittsburgh, Cleveland, Cincinnati, Detroit, Chicago, St. Louis and San Francisco. In time of war each branch will be represented in each of these cities.
>
> "We prevent competition for production facilities by allocation;; first, by cooperation with the Navy Department; second, by allocating certain factories to each supply branch. Each branch gets in touch with the factories allocated to it by means of field agents who visit each factory personally, determine its capacity, and make the necessary arrangements concerning specifications, production schedules and contracts.
>
> "Each branch must have specifications for every item that it purchases. For all standard commercial articles, commercial specifications are used. For special military articles, it is important that consideration be given to the manufacturing process to be used, so that a suitable article may be manufactured in quantity, and as rapidly as needed. All non-commercial specifications prepared in the War Department must be submitted to manufacturers for comment before approval, in order to take advantage of the factory view-point.
>
> "When our plans are completed, we can visualize a picture of the day should war come upon us again. Telegrams to the fourteen district headquarters will in turn initiate telegrams to thousands of manufacturing plants. Each plant will know exactly what it is to produce and when deliveries are to be made. It will have before it a copy of a contract that it will be expected to sign. It will have plans and specifications of the articles it is to produce and, if necessary, jigs, gages and dies, immediately production will start and, in critical articles, at least three months on the average of waste, inefficiency and confusion will be avoided.
>
> "Each manufacturing plant will have been assured an uninterrupted flow of raw materials, of power and of transportation. Where an article is so complex that it consists of component parts, the program will be so balanced that production on all items will proceed simultaneously."



Front of the Munitions or War Department Building in Washington

Prices of Iron and Steel and Other Products

Analysis of Basic Data Shows Metals Lower Than Most Other Commodities—Changes in Past Year Indicated

BY SIDNEY G. KOON

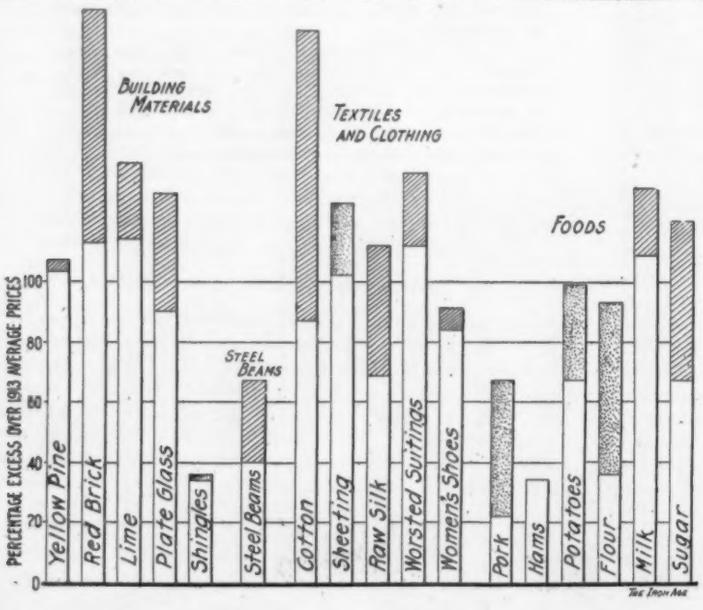
AT intervals during the past few years comparisons have been made in THE IRON AGE of the relative level of prices of iron and steel products to those of other types of commodities. To form a uniform basis for comparison, prices in all cases have been referred to their several levels in 1913 on the assumption that 1913 prices were in general logically related to each other. In some specific instances this assumption may be untenable, but as a general proposition it may be regarded as satisfactory and, particularly, it affords a good measure of reference because of the widespread use of that year as a basis for price relatives of all descriptions.

Articles covering this subject have been published in THE IRON AGE of June 26, 1924, page 1870; Jan. 3, 1924, page 108; Jan. 5, 1923, page 37, and Jan. 6, 1922, page 97. The products covered might be grouped under two headings, one being the relative figures for groups of commodities reported upon monthly by the United States Bureau of Labor Statistics, this including respectively farm products, foods, cloths and clothing, fuel and lighting, metals and metal products, building materials, chemicals and drugs, house furnishings, miscellaneous and the weighted total for all commodities, in which 404 separate items enter.

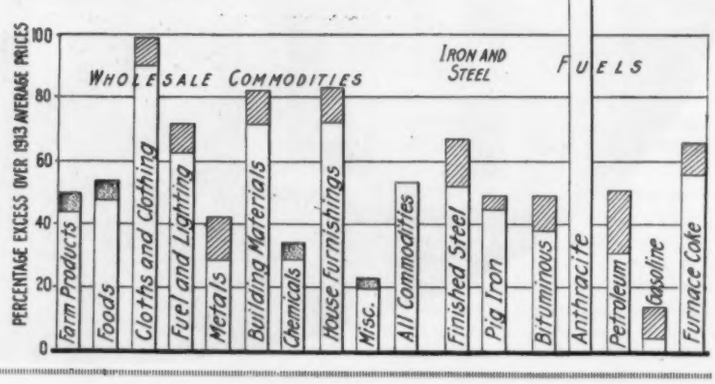
Specific items under survey include finished steel and pig iron, both being based upon THE IRON AGE composite price; five fuels: bituminous coal, anthracite coal, Pennsylvania petroleum, gasoline and furnace coke; six building materials: yellow pine, red brick, lime, plate glass, cedar shingles and steel beams; five items of textiles and clothing: raw cotton, cotton sheeting, raw silk, worsted suitings and women's shoes; six items of foods: mess pork, smoked ham, white potatoes, flour, milk and granulated sugar.

In addition to the table showing the quoted prices, which are drawn from a variety of sources, some official and others market reports of various trade and other publications, three diagrams are shown, each of which indicates the percentage excess above 1913 of the present price and the price of one year ago. One of the diagrams carries the story back on a few items with monthly records through the past four years. In the cases of the specific items shown in the columns, the shaded upper part of the column shows the difference between present prices and those of a year ago. Where this shaded portion has diagonal lines, the present price is lower than that of a year ago. Where the shaded portion is dotted, the present price is higher than it was a year ago.

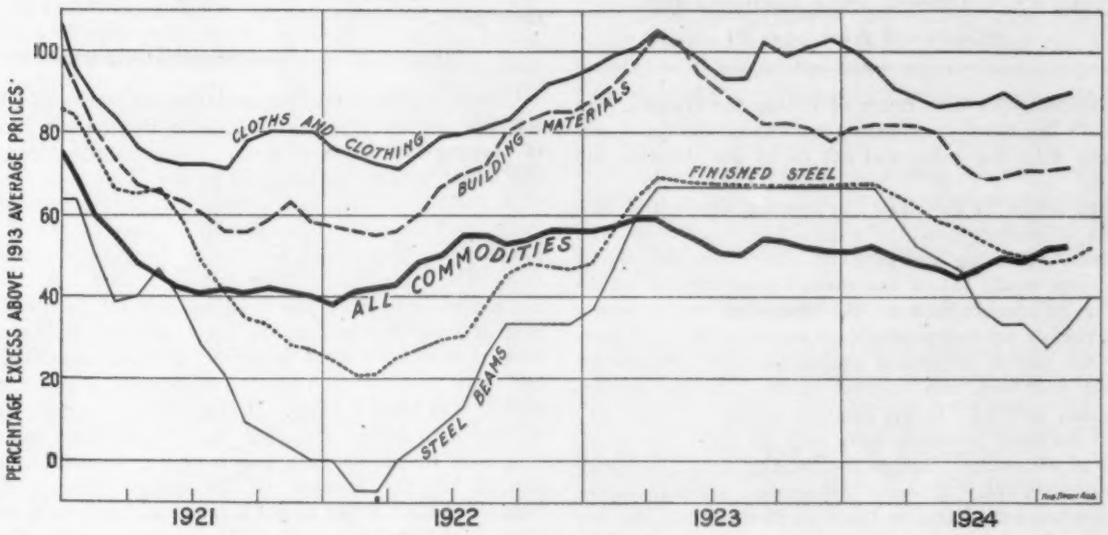
It is evident from a study of the historical changes over the past four years that finished steel prices are



CHANGES in Price During the Past Year Are Indicated by the Shaded Portion of the Vertical Bands Representing the Several Products or Groups of Commodities. Diagonal shading is used in cases where today's price is lower than that of last year; dotted areas where today's price is the higher of the two. It is notable that the diagonal areas predominate except in the foods. In the cases of hams and of "all commodities," the level was the same in each year



STEEL and Iron Items, at 40 to 52 Per Cent Above 1913 Prices, Are Below the General Level of "All Commodities" and Below Most of the Separate Items Shown. Particularly are they below building materials and the clothing and house furnishing items. The metals as a whole are still lower, as some of the non-ferrous metals—copper, for instance—are below their 1913 levels



Four Years of Price Changes in Finished Steel and Steel Beams, Compared with Cloths and Clothing and Building Materials and with the General Average of "All Commodities" Reported by the United States Bureau of Labor Statistics

closely in line with the general level of commodity prices. December figures for the latter are not yet available. In November the "all commodities" item stood at 53 per cent above 1913, while the finished steel was 49 per cent "up." Steel bars are considerably lower than the average for finished steel and correspondingly still lower than the all commodities price. Building materials, on the other hand, remain more than 70 per cent above 1913, while cloths and clothing are about 90 per cent above the base.

Similar indications are shown in the other diagrams. Steel beams, for instance, at 40 per cent above 1913, are far lower than any of the other building materials, with the exception of shingles. Pig iron at 44 per cent above 1913 is considerably lower than the figure for all commodities and is lower than a considerable number of the detailed groups.

Stabilization of Prices

One outstanding feature of the year, in connection with price movements, has been referred to several times in THE IRON AGE. This is the fact that high prices are tending to become lower and low prices, relatively speaking, are tending to become higher. Both are approaching the average of the all commodities reported from Washington, while that figure is showing comparatively little change. It will be noted that the all commodities curve, throughout the past three years, shows only a single point below the 40 per cent line, while no point goes above 60 per cent. During the past two and one-half years no point is above 59 or below 44.

This is a very narrow range of movement and seems to indicate, as has been pointed out more than once, that prices in general have become practically stabilized. This does not mean that they are not to be subject to fluctuations in the future under the same influences which have produced similar fluctuations in the past. It does indicate, however, that in all probability those fluctuations will not be violent nor long sustained, except perhaps in some specific items under special conditions.

It has been assumed all along, by economists and others studying price movements, that the high prices following the World War would tone down gradually and that ultimately we should reach a level not far from that preceding the war. Comparisons with similar price movements following the American Civil War and the world-wide disturbances known as the Napoleonic Wars gave impetus to this belief. Probably this will come about, although the period required for its consummation doubtless will be of many years' duration.

In any case we have now to combat, in any movement in this direction, the very much enhanced wage scale which has grown out of the disturbances of the past ten years—a scale without precedent in previous history, even when judged on the basis of relative values. Greater production per man-hour, greater efficiency in distribution, greater attention to cutting costs wherever costs can be cut, all will be essential if the downward movement of prices is to materialize. All of this means operations on a larger scale and particularly the greatly extended use of machinery of an automatic or semi-automatic character. Under these conditions and these only can history be expected to repeat itself in this particular.

Item	Average 1913	Prices Quoted One Year Ago	Recent Figure	Index Number (1913=100) Peak 1920	Recent Figure
Farm products ...	100	144	...	247	149.5
Food, etc.	100	148	...	248	153.8
Cloths and clothing	100	199	...	346	190.4
Fuel and lighting..	100	172	...	281	162.8
Metals and metal products	100	142	...	203	128.7
Building materials	100	182	...	300	171.6
Chemicals and drugs	100	129	...	213	134.0
House furnishings..	100	183	...	275	172.0
Miscellaneous	100	120	...	208	122.9
All commodities ..	100	153	...	247	152.7
FINISHED STEEL	1.663c.	2.775c.	2.531c.	239	152
PIG IRON (composite)	$14.70	$21.88	$21.24	325	144
STEEL BEAMS ..	1.50c.	2.50c.	2.10c.	207	140
Fuels:					
Bituminous coal ..	$1.34	$2.00	$1.85	746	138
Anthracite coal ...	3.82	10.81	11.48	209	300
Furnace coke	2.41	4.00	3.75	735	156
Penna. petroleum..	1.79	2.69	2.35	341	131
Gasoline	16.8c.	19.1c.	17.5c.	185	104
Building Materials:					
Yellow pine	$28.50	$59.00	$58.00	237	203
Red brick	6.56	19.00	14.33	333	213
Lime	4.43	9.90	9.48	268	214
Shingles, red cedar	1.97	2.64	2.68	334	136
Plate glass	31.8c.	73c.	60.5c.	258	190
Textiles and Clothing:					
Raw cotton	12.84c.	36.3c.	24.0c.	341	187
Sheeting	7.3c.	14.8c.	16.5c.	390	226
Raw silk	$3.65	$7.75	$6.15	445	169
Worsted suitings ..	1.38	3.26	2.93	392	212
Women's shoes ...	2.17	4.15	4.00	380	184
Foods:					
Mess pork	$20.93	$25.50	$35.00	225	167
Smoked hams	16.60	22.30	22.30	227	134
Flour	4.61	6.25	8.90	352	193
Potatoes	61.4c.	1.71	1.22	721	199
Milk	3.5c.	8.1c.	7.3c.	243	209
Sugar	3.46c.	7.47c.	5.78c.	536	167

As 1924 Passes, 1925 Looms Large

(*Continued from page 3*)

a delivered price how much of it was for freight. On Sept. 18 the Steel Corporation announced that it would comply with the order and not carry the issue to the courts.

This action of the Steel Corporation threw into confusion a market that for weeks had been weak and hesitant. Leading independent companies announced that they would follow the Steel Corporation in abandoning Pittsburgh basing. An immediate result was a reduction on several products, of prices to Western buyers. On plates, structural shapes and bars Pittsburgh basing had been non-existent in the Chicago market for many months. In the summer months Chicago mill prices on these products were only $2 a net ton above those at Pittsburgh, though the freight from Pittsburgh was $6.80 a ton. In early September, Chicago prices on bars were the same as those at Pittsburgh. But the abandonment of Pittsburgh basing made quite a difference in sheet, wire and pipe prices. On sheets and wire products the reduction at Chicago district mills was $4.80 a ton. On steel pipe it was $2.80 a ton. On all these products, however, the mills fixed $1 a ton delivery charge in Chicago, so that for buyers in that city the reduction amounted to $3.80 on wire products and sheets and $1.80 on pipe.

NEW BASING POINTS

A first effect of the new regime was the establishment of several basing points on various products. Five such points were named for wire products by the leading producer—Pittsburgh, Cleveland, Chicago, Worcester, Mass., and Birmingham, Ala. On wrought pipe two basings were made, one for Pittsburgh and Wheeling and one for Lorain, Ohio. Cleveland was made a basing point on semi-finished steel, also on wire rods and on cold-rolled strip steel. A December development in the bolt and nut industry was the elimination of basing points and the adoption of a zone system, with full freight allowed to destination within the zone limits.

It was soon apparent that buyers in districts tributary to Chicago were going to make sure of getting their orders on the books of Chicago district mills. The latter, in the weeks immediately following the passing of Pittsburgh basing, booked more business relatively than Pittsburgh and Ohio mills. The indications were at the end of the year that Chicago mills were booked farther ahead on sheets, wire and some other products than those east of them. Buyers appreciated that they would have to pay freight from Pittsburgh or Youngstown on all orders Chicago mills could not take. At the same time Pittsburgh mills, not certain of the amount of overflow from Chicago territory, were making prices on some products to Western buyers that absorbed practically all the freight.

Pittsburgh and Youngstown steel companies are already agitating freight rate changes that will give them a longer radius of shipment to westward. They object particularly to the disadvantage of a fifth-class rate from Pittsburgh as against a commodity rate on steel from Chicago.

There have been reports also of plans for further consolidations in the industry to meet the new regime of plural basing. Some of these plans may be months in maturing. There is no question, however, of the serious purpose of certain independent interests to parallel the advantage of the Steel Corporation in having in different districts large plants from which a variety of finished products can be shipped with minimum hauls to consumers' works.

Considerable additions to steel capacity in the Chicago district are also to be made, to supply Western consumers.

EFFECT ON MANUFACTURING CONSUMER

There has been much speculation as to the effect of the new regime of plural basing on the market radius of varying consumers of steel. Some manufacturers in the metal trades, particularly in the West and South, were inclined at first to the view that if they could buy their steel from the nearest mill at close to the Pittsburgh price they might be able to compete in markets from which previously they had been shut out. It is not yet clear how far the readjustment in the distribution of steel will go, as the result of the change, but steel companies incline to expect greater localizing of the trade in their products, when demand is about normal or less than normal. If this view is correct, there is reason to expect also that the zoning effect will extend also to the secondary industries. Something will depend on the success of Pittsburgh district steel makers in their effort to get a recasting of freight rates from that district.

PITTSBURGH PLUS IN THE EAST

Although independent steel companies followed the Steel Corporation in accepting the Federal Trade Commission order and in quoting mill prices in various districts and in discarding Pittsburgh plus, the fact is that in general producers and consumers of steel are still thinking of steel values in terms of Pittsburgh district quotations. Even though prices at Chicago are quoted without any reference to Pittsburgh base, both buyers and sellers are constantly comparing prices there with those being made by Pittsburgh mills. No matter what the formal compliance with the Federal Trade Commission order, the thinking of the trade is not changed. And so far as the markets east of Pittsburgh are concerned, Pittsburgh basing is still in practically full effect. In eastern Pennsylvania, New York and other districts all market comparisons are still made by the use of the Pittsburgh price, to which freight is added.

LARGER WATER SHIPMENTS FROM PITTSBURGH

The passing of Pittsburgh basing and the difficulty Pittsburgh mills foresee, under existing rail freight rates, in competing in some western and southwestern districts to the same extent as formerly, are leading to a larger movement of steel products from the Pittsburgh district by water. The shipment of finished steel in various forms by barge from Pittsburgh down the Ohio and Mississippi rivers is not new. The Steel Corporation and the leading independent at Pittsburgh have been using river transport for years to reach Memphis, New Orleans and other points from which distribution could be made by rail, making delivered prices that gave them a considerable share of the business for which mills west of Pittsburgh naturally compete. In the readjustments that will come, under the new regime of marketing, more will be heard of water shipments from Pittsburgh and Wheeling district mills into the markets of the South and Southwest.

Movement of Steel and Pig Iron Prices

While in general, over a long period or business cycle, the movement of prices of pig iron is practically paralleled by that of finished steel, this does not hold for short periods. There are not a few instances of fluctuations in the one without corresponding movement in the other. This has been particularly noticeable in the past two and one-half years, as is shown by the diagram of THE IRON AGE composite prices for these two groups of materials as given on page 49.

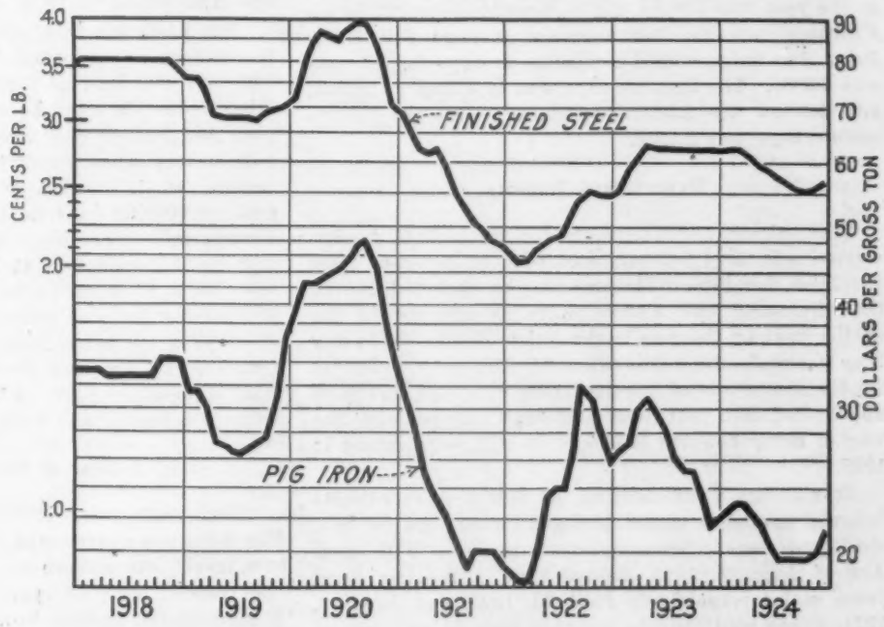
From the fall of 1922, following the coal and railroad strikes, until the close of 1924 the general tendency of the pig iron prices was downward. There was a

sharp recovery through the spring of 1923, due to coke shortage, and resulting in large importation of foreign pig iron. There was another recovery beginning at the end of 1923 and running through four months and there has been a slight increase in the price since last July. From September, 1922, however, to the latest figures, the net reduction has been about 38 per cent.

No such history attends the movement of finished steel prices, for the figure today is higher than it was at any time during 1922. As the curve shows, there was a slight recession during the last three months of 1922, followed by a rise paralleling the coincident rise in pig iron prices. All through the major part of 1923, however, the price of finished steel was practically uniform, while the price of pig iron showed a sharp and almost continuous drop. Since last spring there has been a corresponding drop in the price of finished steel, not so sharp as that which accompanied it in pig iron; and with a much later recovery than was the case with pig iron. The net result is that present prices of finished steel are perhaps 2 per cent above those of the grades, were almost exactly those prevailing in January. Thus the market at the close of 1923 was $22, Valley Furnace, for No. 2 foundry and $23 for No. 2 foundry at Chicago; the same prices prevailed at the close of 1924. The range on foundry iron in 1924 was only $4 from the high to the low point, in the Valley, and basic iron declined from $22 to $18.25, Valley, the latter price being made on a sale of 3000 tons for November shipment. The lowest price commonly made on basic was $18.50, Valley, and from that point there was a rally of $3, the market at the close of the year being $21.50.

DEVELOPMENTS AT CHICAGO

In the Chicago district prices reached their highest point for the year in February at $24.50 base, Chicago furnace, for foundry and malleable grades. July saw the low point of the year at $19.50. Early in February, Buffalo iron was sold in Indianapolis at a price which figured back to less than the ruling Chicago quotation. By early March a reaction in the automo-



FLUCTUATIONS Over Seven Years in THE IRON AGE Composite Prices of Pig Iron and of Finished Steel. While the two have moved approximately in parallel lines at times, their courses during the past two years have been radically different from each other, thus emphasizing their divergent characteristics

fall of 1922, instead of being 38 per cent below the 1922 prices, as with pig iron.

In general, as has been noted many times with regard to these two materials and many other times with regard to raw materials on the one hand and finished or consumers' goods on the other, the changes in pig iron have been much sharper than those in finished steel. The material farthest from the consumer appears to be much more sensitive than that which has undergone the processes of manufacture.

Poor Year for Pig Iron Improves at Close

Apart from its first two months, nothing was so encouraging in the old year as its ending. Until almost the last chapter was ready to be written, the story of the twelvemonth was largely one of unsatisfactory conditions for both buyers and sellers of pig iron; for the buyers because the demand for castings was irregular and limited, and for the sellers because costs were high and a large percentage of the selling was at a loss for merchant furnaces.

It is true that there was moderate buying of pig iron early in the year when the highest prices prevailed, and there was the unusual condition at the close of the year that quotations, especially on foundry

bile industry made itself felt. Southern iron was an important factor and some tonnages delivered in Chicago by barge and rail sold at less than the prices from local furnaces. By the middle of April, curtailment in the operations of automotive foundries, particularly malleable plants, became more pronounced and many of them found it necessary to suspend deliveries of pig iron. Their melt was down to 50 per cent as compared with full operation a month or two before. In the latter part of June, when merchant furnaces opened their books for third quarter and last half, approximately 150,000 tons was driven in by price concessions. Buying then subsided and was not resumed to any extent until the latter part of August. From that time on, there was a gradual improvement in bookings, which, however, had little effect on prices. A week or two prior to the Presidential election, a heavy buying movement set in and within a month about 500,000 tons was contracted for in the Chicago district. As the year closed, the demand was still active, with the pressure for shipments increasing.

NOVEMBER-DECEMBER SALES 1,500,000 TONS

The records of other districts were similar to that just described for Chicago, and at the close of the

year the total sales of pig iron for November and December were fully 1,500,000 tons. Throughout the year, competition of eastern Pennsylvania furnaces with those in Buffalo and other parts of New York State was keen and some very low prices were made, especially in New England.

The outlook at the beginning of the new year is much more encouraging than it was a year ago. It should be noted, however, that the rather rapid advance of pig iron prices at the close of the year was due not only to increased demand, but also to prospective increase in costs due to the action of independent coke operators in advancing wages of workmen in the Connellsville region.

Importations of pig iron were not of so great proportions as in the preceding two years. The total for the 11 months ending with November, 1924, being 180,966 tons, which compares with 355,465 tons for the same period in 1923 and 383,475 tons in 1922. With the gradual advance of prices on foreign grades, the movement from abroad does not promise to be of large proportions this year.

The average of THE IRON AGE pig iron composite in the year was $20.89, the high point being $22.84 for February and the low monthly average $19.31 for July. The finished steel composite average for the year was 2.608c. The high average was in January, 2,783c., and the low was 2.464c. in October, while the December average was 2.535c.

Exports and Imports

The shipment of American steel products to foreign countries in 1924 fell off more than 10 per cent from the total for 1923. That was to be expected, seeing that Germany and France were so crippled in the earlier year by the war in the Ruhr. While not at any time marked, the competition of European countries for the steel trade of non-producing countries was more able-bodied last year, and now that Europe is in the way of being financed it should be still more robust in 1925.

It was again outstanding, as one month's exports followed another's, that Japan and Canada are our best steel customers. Some figures printed in THE IRON AGE of Aug. 28, 1924, showed that in the two fiscal years ended respectively June 30, 1923, and June 30, 1924, Japan and Canada together took 56 per cent of our exports of plates, black and galvanized sheets, barbed and galvanized wire, rails and tin plate. South America and China stand next as consumers of American steel.

Exports of Iron and Steel, Gross Tons

	1920	1921	1922	1923	1924
January ..	333,601	547,394	160,920	123,190	247,942
February .	308,185	393,328	133,975	133,902	164,820
March ...	417,216	230,635	208,843	163,920	123,618
April	395,120	162,592	198,830	177,471	131,276
May	420,359	142,551	230,062	203,389	154,136
June	402,707	119,081	212,295	171,183	163,770
July	458,866	86,523	157,169	168,558	137,481
August ..	431,484	75,827	145,640	161,426	134,628
September.	409,200	95,169	129,475	172,499	135,979
October ..	452,015	106,582	132,924	152,511	157,071
November.	434,297	122,290	127,782	186,956	123,577
December.	498,765	134,415	150,170	177,844	.....
	4,961,815	2,213,042	1,988,085	1,992,849	1,800,000*

*Estimated.

While our steel exports in 1924, on the face of the figures, were about 1,800,000 tons last year, against roundly 2,000,000 tons in 1923, the shipments of rolled products showed a greater disparity, since in 11 months of last year we exported about 40,000 tons more of pig iron, ferromanganese, ferrosilicon and scrap than in 1923; that is, about 135,000 tons against 95,000 tons.

Our tin plate exports last year to the end of November were 148,000 tons against 106,000 in the same period in 1923; steel rails, 186,000 tons against 246,000; structural and fabricated steel, 161,000 tons against 191,000 tons; pipes and tubes, 197,000 tons against 178,000 tons; pig iron, 39,000 tons against 29,000 tons; wire products, 140,000 tons against 193,000 tons.

Machinery exports were about $320,000,000 last year, compared with $290,000,000 in 1923.

The accompanying table shows how the 1923 export shipments of iron and steel products which are stated in the statistics in tons compared with those of previous years.

IMPORTS OF ROLLED STEEL GROWING

The figures show that our iron and steel imports were much less in 1924 than in 1923, but in rolled steel they were more. For the 11 months ended with November we brought in 487,000 tons of iron and steel; in the same period of 1923, 707,000 tons.

But when pig iron, scrap and ferromanganese and ferrosilicon are deducted, the 1924 total is about 203,000 tons and that of 1923 is 100,000 tons. Still another deduction must be made for 45,000 tons of Belgian and French cast iron pipe in 1924, as compared with a very small amount in 1923. Thus rolled steel imports in 11 months of 1924 become 158,000 tons against 100,000 tons in 1923. Belgian, German and French mills have been selling bars on our Atlantic and Pacific seaboards at 1.75c, when domestic prices were $5 to $7 a ton higher. Foreign reinforcing bars are coming in, also some foreign structural steel, at $5 to $8 a ton below home prices. While now only a fraction of 1 per cent of the domestic output, finished steel imports are likely to be larger in the coming year, without being at any time menacing.

A Year of Reduced Earnings

High costs ruled throughout 1924 at steel plants. The 8-hr. day contributed to an increase over the 1923 cost level. But a more serious factor was the effect of the reduced scale of operations. In the first quarter a high operating rate brought down overhead, but in the second and particularly the third quarter the coincidence of restricted output and low prices made a serious inroad on the earnings of most companies.

The Steel Corporation's total earnings fell from $50,075,445 in the first quarter to $41,381,039 in the second quarter and to $30,718,415 in the third quarter. In the third quarter there was a deficit, after paying preferred and common stock dividends, of $122,102.

The Bethlehem Steel Corporation had as total earnings before deductions $10,549,149 in the first quarter, $7,400,894 in the second quarter and $6,495,731 in the third quarter. The deficit in the third quarter, after paying preferred dividends, was $972,962. A common stock dividend was paid for the first quarter only.

The Youngstown Sheet & Tube Co. showed net profits for the first nine months, of $6,091,400 after all charges, compared with $14,689,899 in the first three quarters of 1923.

The Republic Iron & Steel Co. had a net loss of $45,380, after paying interest, in the third quarter, and the deficit was increased to $482,880 by paying the preferred dividend. Net profits for the first nine months of the year were $1,765,004, or $1.50 a share on common stock as compared with $5,434,185 for the like period in 1923.

Preparing for Active Year on Ore Ranges

Outlook in Lake Superior Region Is Encouraging, but Costs Will Not Be Reduced, Taxes May Be Higher and Some Perplexing Problems Are to Be Solved

BY D. E. WOODBRIDGE

As with all other classes of business, the new year in iron ore begins under very different auspices than did 1924. Predictions for a record-breaking iron ore traffic in the Lake Superior region are not wanting, and while these probably are too optimistic, it really looks as though the season might be in the 60,000,000-ton class. At any rate, mining companies are preparing for a very active year; they are adding forces to mines already active, are resuming at mines idle during the past season, and are carrying on an intensive development campaign all around the territory.

There'll be no decrease in costs for the year; wages are unchanged; supplies are all about the same as last year; there may be higher taxes in Minnesota, but they cannot take effect until after the passage of an act raising the occupational rate, which is now 6 per cent on alleged mine profits, and which may be put to 10 per cent by the legislature that convenes in January. If profits are no higher than in 1924, this change will not have much effect on anybody, and they will not be unless there is a betterment in selling price. As to this, it is too early to make any prediction, but the reason that operated to reduce the ore price last year is still valid, and the arguments of last year slant in the same direction now. Very few mines made any money in 1924.

An Unexpected Problem

Of the outstanding facts of the year's developments one may have a bearing on future operations and on the Lake Superior situation as a whole; that is, the unexpected change in silica content of washed ores from the western Mesabi. In the past those ores have run along with 5 to 8 per cent SiO_2 in the concentrates; this year the same mines that used to send out those grades are unable to get so low; indeed, there have been cargoes from them of up to and above 18 per cent silica. No manipulation that the washing plants are able now to give seems to help very much. An 18 per cent silica ore is not merchantable except in small tonnages and for special purposes. If it is going to be impossible to keep this down a large part of the tonnage of the western Mesabi that has been figured as available and merchantable is not so. It may affect several hundred million tons of material at present figured in reserves. The Oliver Iron Mining Co., through its extensive grouping of ores from various mines of diverse characteristics, has been, and still is, able to ship what the furnaces severally want. For this purpose it has had a great reservoir of low silica ores, particularly in its Hull-Rust; but Hull-Rust, large as it is, cannot forever meet demands for mixing, especially as it takes far more ore of 3 to 4 per cent silica content to lower an 18 per cent silica than it does to lower an 8 or 9 per cent. Both fee owners and mining companies are studying this new problem intensively, expecting to arrive at some solution.

In line with this change in the situation, the Oliver company has cancelled its Canisteo, Judd and Holman leases, from which it has produced some 30,000,000 tons of concentrates. Judd is almost exhausted, but the others have a considerable tonnage still intact. These had been feeders for the Coleraine concentrator, but this will have ample ore in other adjacent mines of the same type.

Some New Experiments

At the Mary Ellen mine, near Biwabik, a jigging plant has been erected and operated for part of the year successfully. The plant consists essentially of modified McClanahan-Stone jigs, such as are common in the zinc regions and in brown iron ore fields of the South. It produces an ore running from 56 to 58 per cent, with 10 to 11 per cent silica, taking fine ores, coarse ores and high grade taconites to do this. The plant probably will require many changes before it finally is highly successful, but the idea seems to be a good one and will do to watch. There are many properties in the Mesabi district and elsewhere in the region where ores suitable for treatment by some such plant are to be found.

The complete electrification of the Wabigon open pit mine, of the Hanna Ore Co. has been thoroughly tried out by half a season of operation, and has satisfied the most critical. The plant is working smoothly and easily, is meeting all expectations and there have been no troubles of any material sort since its inauguration last July. This installation was based on the low overall efficiency of the steam shovel and an attempt to overcome it.

The worst disaster in the history of iron mining around the Lakes took place at Milford mine, Cuyuna range, on Feb. 5, when the day shift of 48 men was

Iron Mine Operators Look Cheerfully to the Future

THE great Lake Superior district, which produces fully 80 per cent of the iron ore mined annually in the United States, suffered rather severely last year when the shipments amounted to only 42,623,572 tons compared with 59,026,075 tons in 1923, and prices were much lower with an open reduction of 80c. per ton from the preceding year and selling to a considerable extent below the regular prices. The result was that mining was unprofitable to a large number of operating companies and earnings of employees were greatly reduced.

Fortunately, the new year opens with vastly improved prospects. In this article, D. E. Woodbridge, the well-known mining engineer of Duluth who has had many years of experience in the Lake Superior country, gives reasons for believing that 1925 will record a much more satisfactory story. He also reviews briefly the improved developments of the year and tells of some problems which still remain unsolved. One can never tell what the Minnesota Legislature will do. There is always danger of unwise taxation measures being enacted. The possible results of the bounty 1c. per unit offered by the Province of Ontario present an interesting subject for speculation.

Mr. Woodbridge hints at doubt of the wisdom of building a steel plant at St. Paul by the Ford Motor Co.

engulfed by a rush of mud and water from a nearby pond and 41 were killed by drowning, by suction or by air compression. The State appointed a commission to investigate the accident and place the blame, if any. This has made its report, exonerating the mine management and recommending certain changes in the State's mine inspection law, which has been in force for many years but has not been maintained in line with private practice or with the changes in mining methods. In general the mining companies of the Lake Superior region are far ahead in safety practice, spending large sums for safety devices, for education, and for supervision. As the result, lost time from accidents has decreased greatly all through the district. Milford mine, where the above mentioned accident took place, ran the year 1923 with only two days lost time from falls of rock and other mining accidents underground, and at Spruce mine, with 450 men at work for 14 months, there was not one lost time accident. The proposed new standards will be before the Minnesota Legislature at the coming session.

Immense Amounts Paid in Taxes—Their Relation to Profits

THE subject of taxation is always an interesting one for the iron miners of the Lake region, especially those in Minnesota, where the commonwealth seems to have been most ingenious in discovering methods of taxation. The past year the mines of Minnesota have paid in various forms of taxation approximately $28,000,000, *producing in the period* 31,000,000 *tons of ore. This is in the neighborhood of* 29 *per cent of the value of that ore at the mouth of the mine, after mining and royalty have been paid. During the year, the mining companies finally paid the occupational taxes for the three years up to June* 30, 1924, *amounting to the sum of* $11,738,183. *This amount is* 6 *per cent on profits, profits being not real net earnings at all, but a conclusion arrived at by the State Tax Commission following the law defining the items going to make up mine costs. In the triennium in which this tax was assessed there were mined in the State approximately* 100,000,000 *tons of ore, and this tax payment means an average profit, before deducting royalties and some other items, of about* $2 *a ton. If real and full costs were computed, it would be seen that profits were considerably less than this. While the price for* 1924 *was cut* 80c. *a ton in early trades, the actual reduction from the year before was about a dollar, so receipts from the occupational tax for the fiscal year of* 1924-5 *will be approximately one-half, per ton, what they had been in the preceding period. In order to bring them up to what some legislators think mines should contribute to the State revenues, an attempt probably will be made to increase the occupational rate to* 10 *per cent, instead of* 6 *per cent, as now.*

Ford Motor Co. Exploration

Exploration for new deposits has been trifling; the Ford Motor Co. has continued its program all year on lands in northern Michigan, mostly near Republic, but without favorable results, so far as known. This company adheres to its policy of exploring only lands it owns in fee, and so long as it does this the results are quite likely to be poor. The one overwhelming tendency of the present Minnesota tax laws is against the discovery of ore before it can be rushed out, and against the conservation of resources. No extensive program of advance exploration may be expected in the State so long as Minnesota maintains its policy. That the Ford Motor Co. needs ore is, of course, well known, as is its aversion to paying royalties or other profits to land or mine owners. Its requirements will be very much larger before long than now, with a single plant at River Rouge. I have been told by its Northwestern manager that up to two or three million tons a year would be a fair estimate of needs within a few years. It is known that negotiations were under way between the company and the Cleveland-Cliffs Iron Co. for the purchase of many of the latter's mines and other properties; these are said to be on again. If it will be possible to so untangle joint ownership of some of these properties as to allow the Ford company to hold them for itself alone, an obstacle to purchase will have been withdrawn. The subject is an interesting one for speculative comment.

Has Mr. Ford Really Decided?

It seems to be expected that the Ford company is to erect a steel works at St. Paul, near its new motor construction plant, just completed. The idea is to use Cuyuna range ores and Indiana and Illinois coals, and limestone from the Mississippi River, south from St. Paul. In this way it expects to overcome the natural and serious handicap of St. Paul as a point for the assemblage of materials for steel making. Many well posted men are not willing to accept the rumors of decision to erect this plant at this point as at all definite or final, for the Ford company is looked on as rather long headed.

The Evergreen Iron Co. operates a State lease near Ironton, Cuyuna range; the ore is both coarse and fine and of straight iron and manganiferous grades. This ore body is being stripped for steam shovel mining, and a Dwight-Lloyd sintering plant has been installed to sinter the fine ores screened out after taking away for direct shipment the coarser product of the mine. The moisture content of this ore is high, sintering removes this and is intended to coagulate a poor and dusty ore into a merchantable product. Crude ore is brought to the plant on side dump cars and is fed to a belt conveyor. After screening, oversizes are loaded on cars for shipment and undersize passes through various steps to the sintering grates. The plan is a rather ambitious attempt to conserve material otherwise valueless.

The Year's Shipments

Shipments for the year, by water, amount to 42,623,000 tons, comparable with 59,026,000 the season preceding. All rail shipments will be found to be less than during 1923. The several districts shipped by water as follows, in proportions of the whole:

	1924, Per Cent	1923, Per Cent
Mesabi	67.59	69.86
Gogebic	11.28	10.56
Menominee	9.96	9.50
Marquette	5.91	4.73
Cuyuna	3.03	3.55
Vermillion	2.23	1.80

The season ends with large stockpiles, especially in Michigan and on the Marquette range.

The Oliver Iron Mining Co. is stripping a new mine, Morrison, in the Coleraine district, the Mesabi range, for mining next year. It is deepening several shafts in the Gogebic, the last one to have attention being that at Puritan. It has just moved the townsite of Ke.., near Hibbing, where 26 houses were moved three miles, set on new foundations, with water and sewer connections and ready for occupancy, in the space of 49 days. The Duluth, Missabe & Northern Railway, a Steel Corporation road, has ordered 50 ore cars of a larger size than any yet in use, capacity 85 net tons, say about 75 gross. These exceed the 75-ton cars of the Great Northern road by about 12 net tons. As the unit length for iron ore cars must be 24

ft. over all, these will entail a very heavy load on track structure. They have been tested thoroughly and this order may be followed by others. Considerable work is under way in iron ore shipping piers, both new and to replace piers destroyed by fire. New docks are uniformly of steel and concrete and of large capacity.

The Ontario Bounty

Ontario has decided to offer a bounty of 1c. per unit of iron on all iron ore mined in the Province. It had been expected that the Dominion and the Province would share in this bounty, each paying half, but the former was unwilling to join the plan, as most of the direct benefit was likely to accrue to the Province. Ontario has many large deposits of both magnetite and hematite, though bodies of ore of a grade to permit direct shipment seem to be wanting. While the Mesabi range extends into Ontario, it either is lean magnetite, or if hematite its beds are thin and mixed. The tonnages of magnetic ores suitable for concentration are enormous and are well located with respect to both rail and water transportation, and also as to large available water powers. The Province has a normal annual demand for more than a million tons of ore a year, and can deliver to the States as easily as can the Lake ranges. The foundation for an iron ore industry would seem to be present, only the will to be lacking.

Ore Shipments Not Equal to Tonnage Used

Stocks in Furnace Yards Not Unusually Large—Old Year One of Curtailed Operations at the Lake Superior Mines

THE Lake Superior iron ore trade suffered from the slump in the iron and steel industry in 1924 and the volume of ore business fell off to even a greater extent than the production of pig iron. With the curtailment in pig iron and steel output starting in April or before the opening of the ore shipping season, leading consumers allied with mining companies or owning their own mines began to make drastic cuts in their shipping schedules and some found it necessary to cut their schedules further, later in the year. The reduced demand resulted in the shutting down of some mines and the slowing down of operations in many others. In fact, scaling down orders for ore was more drastic than reduction in consumption.

During the 12 months up to Dec. 1, 1924, there was 45,927,231 gross tons of Lake Superior ore consumed. Lake shipments last year were 42,623,572 tons and the all-rail shipments are estimated at 1,300,000 tons, making a total of approximately 43,923,000 tons or 2,000,000 tons less than the amount consumed. The amount of Lake ore used during the preceding year, or from Dec. 1, 1922, to Dec. 1, 1923, was 62,661,460 tons. The amount of ore on Lake Erie docks and in furnace yards Jan. 1, 1924, was 38,635,051 tons, according to furnace reports, and the amount on hand Jan. 1 this year was approximately 36,000,000 tons. On Dec. 1 last, stocks (on docks and at furnace yards) were 40,178,035 tons, compared with 42,836,466 tons on Dec. 1, 1923. These figures show a reduction in ore stocks on Jan. 1 this year of over 2,600,000 tons or 600,000 tons more than the amount arrived at by comparing shipments with furnace reports of consumption. This discrepancy in the figures results from the method of compiling furnace consumption reports, but both methods of computation show that at least 2,000,000 fewer tons of ore was shipped during 1924 than was consumed.

Ore on Hand

The limiting of ore shipments to less than was used the past year should be a factor favorable to a good season's movement in 1925 because furnaces are not starting the new year with abnormally large stocks which they would be inclined to get out of the way before buying more ore. The amount of ore on hand at furnace yards and docks on May 1 has averaged 19,810,221 tons during the past 13 years. Using very conservative estimates of pig iron production up to May 1, the amount of ore on hand at the latter date will be at least as low as the normal average and if the pig iron production increases during the next four months as much as some estimates indicate, or to an average of 3,220,000 tons per month from December to April inclusive, ore stocks at furnaces and docks on May 1 will be close to 4,000,000 tons less than the normal average on that date.

The ore shipments of 42,623,572 tons by water last year showed a decrease of 27.80 per cent as compared with a water movement of 59,036,075 in 1923. The movement last year was virtually the same as in 1922, when 42,622,248 tons of ore were moved by water. The record season was 1916 when shipments by water amounted to 64,734,198 tons.

Ore Prices Reduced

Iron ore prices for the year were established April 4 at a reduction of 80c. a ton from the preceding year or $4.75 a ton for Mesabi non-Bessemer ore. This cut which brought prices down to a lower point than in any year since 1916 was more drastic than some of the mining companies favored, but others had large stock piles that they were anxious to move and felt that if a sharp cut were made, some of the smaller mining companies that had been in the habit of shading regular prices would be unwilling or unable to go below the prices that were named. This expectation was not realized, as price shading to the extent of 50c. a ton developed during the season.

A feature of the market that was more prominent last year than ever before was the limited amount of open market buying, which appears to be dwindling from year to year as a result of the tying up of mining companies with consuming interests in some form or other. Open market sales last year for the current year's delivery did not exceed 1,750,000 tons according to estimates made by some of the ore men. Purchases of round lots of ore were limited to two or three consumers. However, some good business was taken in term contracts. Competition for business was unusually keen and some producers who adhered to regular price schedules for orders for the current season met competition by making short term contracts with concessions from the regular price schedules for ore delivered last year.

The reduced prices did not and were not expected to create much demand for Lake Superior ore in the East, because, with the prevailing prices of foreign ores and the present freight rates, Lake ore delivered at Eastern furnaces was considerably higher than foreign ores delivered at the same consuming points.

From a transportation standpoint, everything went smoothly in the ore trade last year. The car supply was always ample and the Lake fleet could easily have transported a much larger amount of ore. The rail rate question which had appeared in some of the previous years did not come up, there being no changes in these rates during the year.

Results of Abolishing Pittsburgh Basing

Prices Were Quickly Reduced on Some Products at Chicago, but Pittsburgh Retains Its Preeminence—Indications as to the Future

PITTSBURGH, Dec. 29.—If the various steel consuming districts could secure their entire requirements from nearby mills without recourse to the Pittsburgh district mills; if the manufacturers in the latter district did not have costs as low as any other producing section and lower than most others; if they did not have the experience of years of having shipped more of their production to distant than to nearby consumers and if they had not in the many periods of depression found it necessary to equalize freight charges with some mills located more advantageously in relation to the consuming point, then the abolition of Pittsburgh as a sole basing point for steel prices might have been a more serious matter for the manufacturers of the district than it has been in the little more than three months it has been in force through the order of the Federal Trade Commission and its acceptance by the United States Steel Corporation.

Pittsburgh Receives Inquiries from Chicago Mills

IT has been long contended that strict observance of the Pittsburgh base was limited to times of medium markets; when business was poor and there was not enough for all, the price usually went to a mill base, and when business was good and supply was insufficient, the Pittsburgh base was used only when it would benefit the producer. In the recent improvement in business, the situation has shaped itself much as it did when Pittsburgh was the sole base. Pittsburgh is getting inquiries from the Chicago district, where apparently the mills cannot take on additional tonnage or meet the delivery requirements of buyers. Pittsburgh has been producing ingots lately at 85 per cent of capacity. That does not suggest that the district has lost its "place in the sun" through the abolition of Pittsburgh plus, and while the new order has in some instances meant the replacing of old customers with new ones to avoid having the freight eat too far into the price, Pittsburgh is well located for shipments by the inland waterways and the saving in carrying charges has enabled several of the Pittsburgh companies to get into territory where Chicago district mills ordinarily have an advantage in the matter of rail rates.

Pittsburgh district mills, those located within a radius of 40 miles of the city, have been indirect rather than direct beneficiaries of the so-called Pittsburgh plus mode of quotation; it has been the mills located outside which have been able to collect unpaid freight and which incidentally have had to absorb freight when they have shipped to or toward Pittsburgh. The benefit to Pittsburgh manufacturers accrued from the fact that observance of the Pittsburgh price by outside mills meant, theoretically, that the delivered price at a given destination would be identical, regardless of originating point. This made it possible for mills in the Pittsburgh district to ship to Duluth, to New Orleans, to Boston or San Francisco on even terms with mills that might happen to be located nearer those points; in short, it made for a national market for the steel of the Pittsburgh district, at least in theory. Practically, it has been a horse of a different color.

For almost four years Chicago has had a base on plates, shapes, bars and bolts, nuts and rivets and there has not been a sufficient spread between Pittsburgh and Chicago prices to enable Pittsburgh manufacturers to ship into the Chicago district, except by the absorption of considerable freight charge. Over much of this period Pittsburgh mills have not been supply factors on these products in that district. It likewise has been difficult for Pittsburgh mills to get into a number of points to which Chicago district and Indiana and Illinois mills are favored by a commodity rate of freight, which, measured on a mileage basis, has been only 55 to 65 per cent of the fifth class rates, which Pittsburgh mills have been obliged to pay.

National Market Restricted

So, for almost four years on the products mentioned, the national market for Pittsburgh mills has been curtailed so far as Chicago and the surrounding territory are concerned. Before that and since, Pittsburgh mills, in periods when there was not enough business to go around, have profited little from Pittsburgh plus, since it has been common practice for outside mills to invoice on a mill instead of a Pittsburgh base; in other words to give away much of their freight advantage and thus impose a penalty on mills within the Pittsburgh district. It was in such a period that the Federal Trade Commission made its "cease and desist" decision in its suit against the United States Steel Corporation. Eastern mills were taking business in the heavy tonnage products in the East at prices which, although quoted f.o.b. Pittsburgh, were far below those of Pittsburgh mills. Observance of a Pittsburgh base was anything but rigid on the part of makers of wire products outside of the Pittsburgh district; indeed, quotations were very largely on a mill base on all products except sheets, tin plate and pipe and even on sheets there was some quoting on a mill base.

These things considered, the change imposed by the Federal Trade Commission order probably could not have come at a more favorable time. The new order entailed no very radical departure from existing market conditions in plates, shapes and bars; in cold-finished steel bars, which had a Chicago base since the fore part of the year; in bolts, nuts and rivets in which Pittsburgh for several years has not been a sole basing point, or in several other lines, on which a mill base had largely supplanted the Pittsburgh base. It did mean a good deal of a change in the market situation in sheets, tin plate, pipe and wire, but it is probable that the change has been more costly to mills outside of the Pittsburgh district than to those within it.

Nine Basing Points for Wire

Wire now is sold on at least nine basing points. These are Pittsburgh, Ironton, Ohio, and Cleveland.

with the same base prices; Anderson, Ind., with prices $1 per ton over those at the foregoing points; DeKalb and Joliet, Ill., and Duluth, which are $2 per ton above the Pittsburgh-Cleveland-Ironton base; Worcester, Mass., and Birmingham, where base prices are $3 per ton higher than Pittsburgh, Cleveland and Ironton. The freight from Pittsburgh to Birmingham is 68c. per 100 lb., and with plain wire at $2.60 per 100 lb., the Birmingham mill would secure $3.28 per 100 lb., delivered at Birmingham. With the price $2.90, Birmingham, where it was prior to the recent advance, the producer there would suffer a loss of 38c. per 100 lb. or $7.60 per net ton. The freight from Pittsburgh to DeKalb and Joliet is 34c. per 100 lb. on wire products, or $6.80 per ton; in exchange for that the mills there get an advance on the Pittsburgh base of $2 per ton. The freight from Pittsburgh to Worcester, Mass., is 36½c. per 100 lb. or $7.30 per ton; the manufacturer there for Worcester delivery exchanges that freight, which would have been collected under the old plan, for $3 advance in the Worcester base over Pittsburgh. Of course, a Pittsburgh manufacturer would not be considered wise who would ship to Birmingham and absorb $7.60 per ton, or to other points where the freight absorption would cut so heavily into the net return. Accordingly, wire business has become more localized than it was formerly, notwithstanding that Pittsburgh mills as a rule are retaining old customers even at the expense of smaller net returns. It has been figured by one producer here that taking in the whole country and averaging the favorable and unfavorable shipping destinations, the net return is about $1 per ton less than formerly for Pittsburgh mills, as against as much as $5 a ton less for some Central Western producers.

Pipe Mills Affected

Setting up of three basing points on steel pipe lowers the return to the Pittsburgh producers, but not as much as might be supposed. On Western and Southwestern shipments, Lorain, Ohio, has an average freight advantage over Pittsburgh of about $1 a ton, but Pittsburgh district mills have a corresponding advantage over Lorain on Eastern and Southern business. The freight from Pittsburgh to Chicago on pipe is $6.80 per ton, but the base at Chicago district mills is $4 per ton higher than Pittsburgh and on deliveries into Chicago, the base price is $5 a ton higher than Pittsburgh. Steel pipe is sold on the base at the point having the lowest freight rate to destination; thus a shipment for California would be based on Evanston, Ill., or Indiana Harbor, Ind., with a rate of $20 per ton and a base price of $4 per ton over Pittsburgh. California buyers actually would save money by buying in Pittsburgh, Youngstown, Lorain, or Wheeling, since the base price would be $4 a ton below the Chicago district mill base, while the freight would amount to only $3 a ton more than if shipped from the Chicago district. The case would work out differently with other points in the West, where the competition provided the railroads by the Panama Canal is not a factor in railroad rates, as it is to Pacific Coast points. But California is a large consumer of pipe, notably for oil wells, and this instance is taken to support the contention that Pittsburgh producers are not suffering greatly by the changed order.

Situation as to Sheets

While the American Sheet & Tin Plate Co. has set up basing points on sheets at Gary, Ind., and its Pittsburgh district mills, with prices $2 per ton higher on black, galvanized and blue annealed sheets at Gary than at Pittsburgh, and the Inland Steel Co. is on the same base at its mills as the American Sheet & Tin Plate Co. is at Gary, the sheet industry as a whole has not yet moved far from a Pittsburgh basing. If the term, "and freight added from Pittsburgh," no longer appears in the invoices, the delivered price recognizes the Pittsburgh price and freight from Pittsburgh to destination. While there is a good deal of production in the Pittsburgh area from which there is a common rate of freight east and west, it is small by comparison with that produced outside the area, notably in Ohio. Central and eastern Ohio producers have to absorb freight when they ship east or west, against either the Chicago or Pittsburgh district mill bases, and are losers by the setting up of these bases, although well located for shipments north or south.

Effects of Change in the Chicago District

Reduction in Prices of Wire Products, Sheets and Tin Plate Was Immediate—New Construction Not Encouraged

CHICAGO, Dec. 29.—In the Chicago district, the immediate effect of the abandonment of Pittsburgh plus was a sharp reduction in prices of wire products, sheets and tin plate and a moderate concession in steel pipe. A reduction of $1 a ton on wire and wire products at Pittsburgh and the setting up of separate Chicago district mill bases with prices only $2 a ton higher than the base quotations at Pittsburgh, meant a net decline of $5.80 a ton, or $1 less than the freight from Pittsburgh to Chicago. The actual reduction to buyers in the city of Chicago, however, was only $4.80 a ton, inasmuch as none of the mills of the American Steel & Wire Co. is in the corporate limits and an arbitrary delivery charge of $1 was established to take care of the average cost of the freight from plant to customer's siding. On sheets and tin plate likewise Chicago district mill prices were fixed at $2 a ton above the quotations at Pittsburgh, but as the latter remained unchanged, the reduction at Western mills was $4.80 a ton. For these commodities also an arbitrary of $1 was charged for delivery in Chicago, making the net reduction for buyers in that city $3.80 a ton. Although less than one-tenth of the pipe of the country is produced in the Chicago district and that commodity was not mentioned by the Federal Trade Commission in its order directing the abolition of Pittsburgh plus, the Youngstown Sheet & Tube Co. voluntarily set up Evanston, Ill., and Indiana Harbor, Ind., bases on standard black and galvanized pipe, making the discounts two points less, or the equivalent in prices of $4 a ton higher than at Pittsburgh. This meant a reduction at the Chicago district mills of $2.80 a ton. For delivery in the city of Chicago, the discounts were fixed at 2½ points less than at Pittsburgh, or about $5 a ton higher in price than the Pittsburgh quotations. The net saving to the Chicago buyer who formerly paid the freight—$6.80 a ton—plus the Pittsburgh price, was $1.80 a ton.

Fine Wires Sharply Reduced

Among minor products, fine wires were sharply reduced. Stone wire and broom wire, which had formerly been quoted at 4.75c. and 7c. base, f.o.b. Pittsburgh, respectively, were put on three new bases—

4c., base, Cleveland, and 4.20c., base, Worcester, Mass., and Waukegan, Ill., for stone wire, and 6c. base, Cleveland, and 6.20c., base, Waukegan and Worcester for broom wire. Here again the Chicago buyer depending on Waukegan for a source of supply, benefited. Weaving wire, however, remained unchanged, except that the base price, 9.25c., was shifted from Pittsburgh to Cleveland.

No separate Chicago base was established on cold-rolled strip, but as Cleveland base was set up on a parity with the Pittsburgh base, the Chicago price became the total of the Cleveland quotation plus the freight of $6.00 per ton, as against a freight of $6.80 from Pittsburgh. The reduction to Chicago consumers, therefore, was 80c a ton.

Practically all other finished iron and steel products were on a Chicago base for, some time before, the United States Steel Corporation announced its intention of complying with the Trade Commission's order. For years bar iron had been on a Chicago base and rail steel bars and rails on an f.o.b. mill base. Within the past year or two, track supplies had also been placed on a mill base. Steel bars, structural shapes and plates had been on a Chicago base since the summer of 1921, the Chicago prices usually being about $2 a ton above the ruling figures at Pittsburgh, or $4.80 lower than they would have been if the Pittsburgh plus practice had been adhered to. Billets and sheet bars likewise had been sold f.o.b. Chicago, ordinarily at the same prices as those ruling at Pittsburgh, and within the past year hot-rolled strip was placed on a Chicago base, which is usually $2 a ton above the Pittsburgh base price. Likewise for about a year alloy steel bars have been sold at prices, f.o.b. Chicago, $2 a ton above the ruling quotations at Pittsburgh, while cold finished steel bars have been quoted at the same price at Chicago as at Pittsburgh.

Custom as to Nuts and Bolts

For approximately two years, bolts and nuts in sizes and styles made in Western plants had been sold at the same prices at Chicago as at Pittsburgh. Separate Chicago bases had also been in effect on rivets, although those quotations were usually $2 to $3 a ton higher than at Pittsburgh. On Oct. 1, all sizes and styles of bolts and nuts, regardless of where they are made, were placed on a double basing, the Chicago base prices being made equal to those at Pittsburgh in each case. In December the twin bases were abolished when producers decided to allow the freight to their customers' doors, thereby establishing common delivered prices throughout the territory east of the Mississippi River and north of the Ohio River as far as a line drawn from Dubuque, Iowa, to Milwaukee, Wis.

Some Producers Aggressive

An interesting sequel of the abandonment of Pittsburgh plus was the aggressive attitude pursued by independent Ohio and Pittsburgh district producers of wire products, sheets and pipe in the Chicago market. Notwithstanding the heavy freight disadvantage which they had to absorb to meet the new Chicago mill basings, they refused to abandon their Western trade. In this respect they stand out in sharp contrast with Eastern mills rolling plates, shapes and bars, which have not been serious factors in Chicago territory since those products were put on a Chicago base. In fact, the original Chicago district mill base prices on wire products were in danger of being undermined as a result of circumstances attending the full development of the separate mill basing program. Following the first announcement of new basing points, prices of common wire products at the Anderson, Ind., plant of the American Steel & Wire Co. were established at $1 a ton above the base prices at Cleveland and Pittsburgh, or $1 a ton lower than at the Chicago district mills, i. e., Waukegan, Joliet and DeKalb. Yet the freight rate from Anderson to St. Louis is identical with the rate from Joliet. This made it necessary for independents in the Chicago district to meet the delivered prices at St. Louis from Anderson to retain their trade. Another complication arose from the fact that prices on common wire products at Duluth were originally fixed at $4 a ton above the base prices at Cleveland and Pittsburgh, or $2 a ton above the base prices at Chicago district mills. Before the close of the season of navigation, independents in the Ohio and Pittsburgh districts shipped stocks to Duluth via the Great Lakes, thereby escaping a part of the all rail freight penalty. Likewise, Western independents established stocks at Minneapolis and St. Paul. Subsequently the mill base prices at Duluth were reduced to $2 a ton above the base prices at Cleveland and Pittsburgh or to the parity with the base prices at Chicago district mills. This move, of course, was embarrassing to those producers which had taken steps to take care of their Northwestern trade and the immediate result was exceedingly keen competition in which the established base prices were largely disregarded. For a time, both Eastern and Western independents sold common products as far west as the Missouri River at $2 a ton below the Chicago district mill bases, thus completely wiping out the differential between the Chicago mill and the Cleveland and Pittsburgh bases. This situation was brought to an end by the post-election buying movement which not only brought stability to the various mill base prices, but also resulted in a general $2 a ton advance.

Many Irregularities

During approximately the same period there were numerous irregularities in sheet prices, but these apparently were attributable principally to the confusion arising from plural basing points. In fact, it is probably significant that the creation of separate mill bases on sheets in the Chicago district was not followed by reductions in Western warehouse prices. Sheet capacity in Indiana, Illinois and Wisconsin is estimated at not over one-tenth of the capacity of the country at large and there is no doubt that Western jobbers felt that they would still have to buy considerable tonnage from Ohio and Pittsburgh districts and that the premiums which they might have to pay in times of strong demand might more than balance the savings accruing to them during a dull period.

A common expectation in the West was that the abolition of Pittsburgh plus would greatly stimulate mill construction in Chicago territory. Thus far, however, no construction projects have been undertaken which were not under way before the United States Steel Corporation announced its compliance with the Federal Trade Commission's order. It is to be remembered in this connection that Pittsburgh plus had already been abandoned on all products except sheets, wire products, tin plate and pipe, and that market conditions affecting the heavy tonnage products—plates, shapes and bars—are no different now than they have been since the middle of 1921. It must also be borne in mind that the relation of the consumption to the capacity of the country at large has not been changed by the establishment of multiple basing points. It has been a common comment since the war that the iron and steel industry is overbuilt. Hence, although future expansion may tend to center in the Chicago district, producers may be slow in creating new mill capacity there until they feel reasonably sure that consumption has caught up with output.

New Construction Projects

The Jones & Laughlin Steel Corporation, Pittsburgh, bought 1000 acres at Hammond, Ind., some two years

ago, but as yet has done little to develop it. To be sure, there have been additions to Western capacity within the past few years, but they have not been of a spectacular nature. The National Tube Co. is now completing a large steel pipe mill at Gary, Ind. Clayton Mark & Co. have just put into operation two new buttweld pipe mills in Chicago with a capacity of 75,000 tons a year. The Inland Steel Co. within the past year has completed a large merchant bar mill and a new billet mill. The Youngstown Sheet & Tube Co. has recently added a new buttweld mill at Indiana Harbor and is completing a second blast furnace at that plant. It also proposes to construct a wire rod mill, a wire and nail plant, a sheet and tin plate mill, and three additional open-hearth furnaces in the Chicago district. Just how soon this program will be undertaken, however, is still uncertain. Among secondary factors, the McClintic-Marshall Co., Pittsburgh, recently purchased the Morava Construction Co. and the Kenwood Bridge Co., both Chicago fabricators of structural steel. This transaction, however, involved the erection of no new capacity in the Chicago district. In fact, the McClintic-Marshall Co. for a number of years has owned a large tract of land at Indiana Harbor, Ind., but preferred to buy existing capacity rather than to build a new plant in the Chicago district.

Cleveland as a Basing Point

CLEVELAND, Dec. 29.—The elimination of Pittsburgh plus has resulted in the making of Cleveland a basing point only on steel products manufactured in that city by the American Steel & Wire Co. Independent mills outside of Cleveland fell in line in making Cleveland a basing point on these items. The products sold on a Cleveland base include nails and wire, cold-rolled strip steel and wire rods. Consumers in Cleveland and vicinity benefit to the extent that they use these products. Bars, plates and structural material for Cleveland delivery are still sold on the Pittsburgh base or at a delivered price equivalent to the Pittsburgh price plus the freight, so that on these consumers have not benefited. One change that may be indirectly attributed to the basing point changes is the making of Cleveland the basing point for rivets.

River Helps in Cincinnati District

CINCINNATI, Dec. 29.—Elimination of Pittsburgh plus has not resulted in any marked changes in quoting steel prices in the Cincinnati district. During the past several years, there have been two basing points, Chicago and Pittsburgh, with Chicago mills enjoying lower freight rates to the more important consumption points in this district. These mills generally quoted $2 to $3 per ton above Pittsburgh prices, depending on freight advantages to points of consumption. The same condition exists today. Chicago mill prices are generally $2 per ton higher than those of Pittsburgh, and mills in the latter district are equalizing freight rates to competitive points in this district. The principal result of the abandonment of Pittsburgh basing is that independent mills in Pittsburgh district are getting a lower net return on materials shipped into the greater part of this territory. Mills in the Cincinnati district have adopted the policy of quoting f.o.b. Pittsburgh or Chicago, according to location of the consumer, with freight allowed. By using the Ohio River for shipping steel products, Pittsburgh district mills have been able to meet Chicago prices to large buyers at lower Ohio River points, but to the average buyer the river has not as yet proved of value, as it has not been found practicable to ship less than barge loads in the absence of facilities for handling steel at river points, much less to reship it to points removed from the river bank.

European Markets Show Some Betterment

Surveys from France, Germany, Belgium and Luxemburg Indicate Greater Production West of the Rhine

CONTINENTAL European countries have had a year of heavy production in iron and steel, judged by records of the immediate past, and some of them have gone beyond all previous records. In France, Belgium and Luxemburg, in particular, has activity been high. Some of the production data covered in detail in later paragraphs may be tabulated, roughly, as follows, all figures being in metric tons per month:

	France		Belgium		Luxemburg	
	1924*	1923	1924*	1923	1924*	1923
Pig iron	636,000	441,600	234,500	180,000	178,700	117,000
Steel ingots	574,000	415,000	233,000	184,700	154,600	99,800
Finished steel	.....	.....	199,000	161,100	.....	.....
Iron ore	2,310,000	1,950,000	.....	.....	.....	.....
Coke	216,000	165,000	363,500	346,400	97,600†	30,500

*Average of first ten months. †Supply of "reparations coke."

French Iron and Steel Industry in 1924

A FULL supply of coke and a market reflecting inversely the fluctuations of the franc are the two facts that immediately come to the mind when reviewing the French iron and steel trade in 1924. Whenever the £ and the $ were quoted high in French currency the market showed much improvement, especially for export. In March last, when the £ was worth over 125 fr. and the $ over 27 fr., French ironmasters booked a volume of orders larger than they had done since the beginning of the crisis.

In 1923 the French collieries produced 1,985,735 tons of coke, or 165,000 tons per month. During the first ten months of 1924 they already have produced 2,159,109 tons (about 216,000 tons per month), which points to a probable production for the whole year of 2,600,000 tons of coke.

But collieries are not the only coke producers in France. Coke is made also at independent coke ovens, as well as at coke ovens attached to iron works. No statistics are published concerning these two sources of production; but private information permits us to say that their aggregate yield varies between 150,000 and 180.000 tons of coke per month. Therefore we may estimate the probable total output for the first ten months of 1924 at 3,660,000 tons.

France imported, in 1923, only 3,628,393 tons of

coke, or a monthly average of 302,000 tons, of which 2,073,460 tons came from Germany (173,000 tons a month). During the first ten months of 1924, the total French imports of coke were 4,650,299 tons, or 465,000 tons per month, of which 3,905,497 tons, or 390,500 tons per month, came from Germany.

Iron Ore

During 1923, France produced 23,428,160 tons of iron ore, or a monthly average of 1,950,000 tons. For 1924, we have the figures for only the first nine months, which show an average production of 2,310,000 tons per month, as follows:

	Tons		Tons
January	2,257,220	June	2,188,095
February	2,162,722	July	2,415,131
March	2,292,300	August	2,416,530
April	2,144,691	September	2,624,944
May	2,286,116		
		Total	20,787,804

In 1913, the production of iron ore of France, plus the production of the Metz-Thionville district, averaged 3,781,702 tons per month. Stocks at the end of September, 1924, were only 1,955,445 tons, against 4,473,740 tons on Dec. 31, 1923. Present French production of iron is hardly sufficient to meet both inland requirements and foreign orders, and no further outlets are consequently being looked for.

During the first nine months of 1924 France imported 530,000 tons of iron ore (227,000 tons from Luxemburg, 156,000 tons from Spain, 75,000 tons from Tunis and 47,000 tons from Algeria); but she exported 8,761,000 tons of iron ore, of which 5,449,000 tons to Belgium and Luxemburg, 1,802,000 tons to the Saar district, 922,000 tons to Germany and 450,000 tons to Great Britain.

Pig Iron

On Dec. 31, 1923, France had 125 furnaces in blast, 51 ready to be started and 43 in construction or under repair, a total of 219 blast furnaces. Corresponding figures for Alsace-Lorraine were 37, 18 and 13; and for the remainder of the Eastern district 51, 17 and 16, respectively. On Nov. 1, 1924, out of 220 furnaces in existence, 135 were in blast, 38 out of blast and 47 in construction or under repair, of which 43, 10 and 15 in Alsace-Lorraine and 53, 16 and 16, respectively, in the other parts of the Eastern region.

During 1923 France produced 5,299,581 tons of pig iron, or a monthly average of 441,600 tons. This figure was adversely affected by the reduction of production in February to May, owing to the restriction of coke supplies consequent upon the occupation of the Ruhr (production in February, 305,526 tons; in March, 316,146 tons, etc., against 564,655 tons in December, 1923). The production of 1923 comprised 3,580,384 tons of basic pig iron and 1,156,571 tons of foundry pig iron.

During the first ten months of 1924 France has produced 6,357,895 tons of pig iron, or a monthly average of 636,000 tons. The largest monthly output was realized in October, 659,926 tons, and the smallest in January, 585,978 tons.

If the rate of production is kept up in November and December, France will be able to register a record production for 1924 of, approximately, 7,630,000 tons. The output of the first ten months of 1924 is divided as follows among the various kinds of pig iron produced:

Basic	4,538,923 tons
Foundry	1,292,439 tons
Forge	339,372 tons
Special	153,166 tons
Bessemer	33,921 tons

In 1923 France produced 4,976,869 tons of raw steel, or a monthly average of about 415,000 tons, of which 4,853,000 tons of ingots and 123,000 tons of castings. The lowest monthly output was that of February, for the reasons mentioned above regarding pig iron, 289,787 tons; the largest, that of December, 525,509 tons. The production of 1923 comprised principally:

Basic steel	2,922,345 tons
Open-hearth steel	1,896,850 tons

During the first ten months of 1924 France has produced 5,743,443 tons of raw steel, or a monthly average of 574,000 tons, divided into 5,607,028 tons of ingots and 136,415 tons of castings. October showed the largest output, 609,122 tons, and January the smallest, 541,020 tons. The following kinds of raw steel made up the production of the first ten months of 1924:

Basic steel	3,730,164 tons
Open-hearth steel	1,874,956 tons
Bessemer steel	70,410 tons
Steel produced in electric furnace	57,227 tons
Crucible steel	10,686 tons

If the production is kept up at the present rate in November and December, 1924 will be a record year, for the French production of steel, with about 7,000,000 tons.

Imports and Exports of Iron and Steel

During the first ten months of 1923 and 1924, France imported and exported, respectively, the following quantities:

	Imports		Exports	
Metric tons	1923	1924	1923	1924
Pig iron	48,282	36,957	485,753	617,155
Ferroalloys	4,732	8,429	17,813	15,364
Steel ingots	2,510	7,638	12,889	6,534
Blooms, billets and bars	168,366	241,550	712,322	1,072,868
Wire rods	22,414	32,564	37,052	68,758
Hoops	39,790	42,487	15,330	9,029
Sheets	102,521	109,836	36,257	51,111
Rails	35,439	6,147	193,809	246,092

In 1923, for the classes mentioned, hoops and sheets excepted, exports exceeded imports. During the first ten months of 1924, except for steel ingots, hoops and sheets, we were large exporters and mediocre importers. Imports have shown this year, by comparison with 1923, a decrease for pig iron and rails, but an increase for all the other items. Exports showed, compared with 1923, an increase for pig iron, for blooms, billets and bars, for wire rods, for sheets and for rails, but a decrease for ferroalloys, steel ingots and hoops.

During the first ten months in 1924 France exported to the United States 16,616 tons of pig iron, 3757 tons of blooms, billets and bars and 5168 tons of rails.

It is not impossible that, once our budget is balanced and German reparation payments effectuated, our financial situation will improve somewhat, but we nevertheless shall remain overburdened with taxes and with a formidable war debt, the service of which requires every year an increasing number of milliards. As there is no immediate prospect of the liquidation of this war debt, it is presumable that our franc will not recover before long.

Belgian Iron and Steel in 1924

PRODUCTION of coke in the Belgian mines in 1923 was 346,366 tons a month (average), against 293,580 tons in 1913. The production for the first ten months of 1924 was as follows:

	Metric Tons		Metric Tons
January	375,800	July	354,340
February	351,480	August	337,120
March	367,360	September	360,410
April	355,400	October	331,600
May	456,810		
June	344,420		3,634,740

Arrivals of coke from the Ruhr for the first 10 months of 1924 were 489,340 tons, making a total supply as from January to October of 4,124,000 tons of coke, in round figures.

In 1923, the average number of furnaces in action was 40, against 54, average of 1913. The table indicates the average number of furnaces in operation during the first 10 months of 1924 and shows monthly production of pig iron to have averaged 234,500 tons.

	Blast Furnaces		Pig Iron, Metric Tons
January	41		208,980
February	42		205,930
March	46		230,490
April	47		239,530
May	47		246,520
June	48		236,730
July	48		247,380
August	49		244,310
September	48		238,750
October	47		246,240
(Average)	46.4	Total	2,344,860

(Belgian Francs)	Beginning of Year	March 13	April 10	May 1	June 1	July 1	Aug. 1	Oct. 1	December Inland	December F.o.b. Antwerp
Foundry iron No. 3..	420 to 425	490 to 500	455	420	420	420	380	330	360 to 370	360 to 370
Basic iron	400 to 410	475 to 495	...	400	400	410	370	325	350 to 360	350 to 360
Blooms (export)	535 to 540	660 to 670	550	525	550	550	480	425	480 to 500	£5 to £5 16s.
Billets (export)	565 to 570	700 to 725	580	550	575	575	500	445	510 to 530	£5 4s. to £5 5s.
Steel bars (export) ..	650	800 to 825	675 to 700	600	620	600	570	525	550 to 560	£5 17½s. to £6
Beams	610	775	650 to 775	575	610	600	565	520	530 to 540	£5 12½s. to £5 15s.
Wire rods (export)..	800	925 to 950	...	800	750	750	680	600	620 to 630	£6 12½s. to £6 15s.
Heavy sheets	710	...	825 to 875	700	720	750	690	630	670	£7

Steel Ingots

In 1923 the monthly average production of raw steel (ingots) was 184,720 metric tons, compared with an average of 200,398 tons a month in 1913. The monthly average production of castings (first fusion) was 5771 tons, against 5154 tons in 1913. The production for the first 10 months of 1924 showed a monthly average of 233,000 tons and 6800 tons, respectively, as follows:

	Ingots	Castings (First Fusion)
January	224,670	6,300
February	219,160	6,750
March	234,170	6,880
April	233,630	7,110
May	243,540	6,980
June	218,640	6,450
July	238,490	6,500
August	231,230	6,860
September	237,930	6,790
October	248,910	7,470
Totals	2,330,370	68,090

Irons and Finished Steels

The output of finished steels in 1923 was on the average 161,115 metric tons per month; that of 1913, 154,922 tons; the monthly production of finished irons was 17,311 tons in 1923 compared with 25,362 tons in 1913. For the first 10 months of 1924, the production showed an average of 199,000 tons and 16,800 tons respectively, as follows:

	Finished Steels	Finished Irons
January	200,900	19,270
February	192,820	18,440
March	206,470	17,860
April	195,670	18,970
May	203,700	17,120
June	184,190	14,350
July	202,850	16,380
August	194,120	15,020
September	193,970	13,010
October	215,090	17,540
Totals	1,989,780	167,960

Iron and Steel Foreign Trade

An indication of the Belgian exports of iron and steel products during the first half of the year (statistics are issued very rarely) may be found in the returns published by the "Union Belgoluxembourgeoise" for the six months of 1924, compared with 1923:

Exports	First Half 1923 (Metric Tons)	First Half 1924 (Metric Tons)
Ingots	7,200	17,400
Blooms and beams..	42,100	69,800
Billets and largets..	183,500	269,200
Beams	90,200	120,800
Rails	72,200	131,300
Sheets	85,700	128,200
Bars	481,700	711,200

Upon the whole, the part of Belgium in the above exports is about half of the indicated figures. For all of 1913, the exports of Belgium in beams, rails, sheets and bars were 1,100,000 tons.

The Market Situation

The Belgian iron and steel market is known to be, mainly, an export market. It has been dominated almost exclusively in 1924 by the fluctuations of the Belgian franc, reflected in the rates of sterling. The comparative table at top of page will show the current prices at which business has been done throughout 1924.

The plants have been fairly well supplied in coke and there has been no complaining of any shortage of fuel this year. On the other hand, the fall in both inland and indemnity coke prices has somewhat counterbalanced the decline of selling prices. The Belgian iron and steel industry has benefited by a certain recovery which occurred from the end of October up to the last of November. It is usually ahead of the French market as regards rise or fall; this is what happened again at the outset of December; business is more quiet and prices in slight regression.

Luxemburg Iron and Steel in 1924

DURING 1923 the number of blast furnaces in operation in the Grand Duchy averaged 35 out of 44; the same proportion has been reached during the first ten months of 1924.

The total output of pig iron in 1923 was 1,406,666 metric tons, compared with 1,685,700 tons in 1922 and 2,547,861 tons in 1913, at which date Luxemburg was included in the German "Zollverein." For the first ten months of 1924 Luxemburg produced 1,787,407 tons of pig iron, or a monthly average of 178,740 tons, against 117,200 tons last year. The bulk of the pig iron output is basic, the foundry iron averaging but 3000 tons per month.

The output of steel in 1923 aggregated 1,197,739 tons, against 1,394,103 tons in 1922 and 1,182,227 tons in 1913. Last year's deficiency of output is attributed to the penury of coke which prevailed throughout Luxemburg, France and Belgium, with the beginning of the occupation in the Ruhr. In the first ten months of 1924 the production was 1,545 841 tons of steel, a monthly average of 154,584 tons, compared with 99,800 tons in 1923. The production of steel is mostly of basic, open-hearth and electric steel reaching a total of 2000 tons about per month.

The output of pig-iron during January and February did not exceed 163,500 tons (average); it has been, since, around 180,000 tons per month, with a slight diminution in June and September; the output of steel was more uniform. In spite of the weakness of the market, ironmasters generally have thought best to reduce selling prices rather than increase production cost by restricting output.

During the first ten months of the year, there were bitter complaints on the part of ironworks of the difficulties encountered for the transport of their products through the Belgian railroads and some already have laid plans to divert their exports via Dunkirk instead of Antwerp.

Reparation Coke

The supply of reparation coke aggregated 366,178 tons in 1923; for the first ten months of 1924, the Grand Duchy has had 976,100 tons of Ruhr coke. As from Dec. 1, this country will not be included in the amounts received from Germany, and must provide its supply in Germany, in Belgium, in Great Britain and even in the United States.

Market Situation

The Luxemburg iron and steel market—exclusively an export market—was active during the first quarter of the year, on account of the depreciation of the Belgian franc. Orders came in abundantly and it was necessary to restart some furnaces.

But at the middle of March, the pound started a backward movement and from March 27 on, was about stabilized around 100 fr. Prices of iron and steel products, which had advanced strongly since January, immediately fell off. The differences were partly covered by the decrease in the price of coke. A slight recovery was registered in October, accentuated in November. A certain subsidence in trading now prevails and prices are at a standstill. The plants are well booked up to the end of January.

Current prices applied for export are much the same or slightly lower than Belgian competitive prices; on

the other hand, Germany—back on the market now for several months—is offering the lowest quotations and, for this reason, likely will get the lion's share in future.

Conclusion

This conclusion will hold good for both Belgium and Luxemburg, since these two countries are united in one customs union and both are predominantly exporters of iron and steel products, Belgium having but a restricted inland market for her production and Luxemburg practically none at all.

Though there exists no formal connection between France on one side and Belgium and Luxemburg on the other, the conditions of the iron and steel market in the three countries, for any given period, are always almost identical. Nevertheless, France has the advantage over the two other countries of a larger inland and colonial market, though she must, of course, rely more and more on exports.

Elements that would permit us to predict a genuine revival of the market are still lacking. This revival could take place only if the political outlook were at last completely rid of all black spots and if Germany fulfilled exactly the obligations assumed by her under the Dawes plan. Therefore, we are unable to foresee for the year to come extremely active conditions for Belgium and Luxemburg iron trades. All we can hope for is that present conditions should be maintained and that a more normal situation should gradually come into being, slowly and without jerks. It would be necessary also that the cost of living should cease to increase, to avoid further wages increments that would diminish the competitive power of selling prices already too high.

Ironmasters of Belgium and of Luxemburg, like those of Frence and of Great Britain, should derive great advantages from joining an international organization that would regulate production and prices.

German Iron and Steel Market Shows Improvement

BERLIN, GERMANY, Dec. 13.—The industrial improvement continues and the iron and steel and metal-consuming branches are feeling the effect. The number of unemployed has dropped to 426,000 on Nov. 15, since when the labor market has improved further. In the six weeks ended Dec. 10 unemployment in the metal branches declined by 22.17 per cent.

The new Steel Syndicate continues its output-restriction policy. For December the raw-steel production was reduced by 20 per cent and semi-finished material by 10 per cent. At the last session it was decided to retain these percentages for January.

Other Syndicates Slow in Forming

No progress is reported in forming the expected subordinate syndicates for bars, sheets, wire and other specialized products. Some of the big concerns, having created their own selling organizations, object to entrusting their future sales to syndicates. The fusion movement in the iron and steel trade, experts declare, will be furthered if the United States lends money to corporations in this branch, because only concerns of first-rate magnitude could directly negotiate for loans in New York.

The Essen organ of the steel trade declares that reports concerning a nearly-achieved agreement with France, as a nucleus of a wider international steel syndicate, are untrue. Fritz Thyssen and other German steel magnates who are in Paris are there only as experts on steel and iron as one of the important interests involved in the pending Franco-German commercial treaty negotiations; they have not discussed any plans for direct agreement with the French steel industry. The present main German interest is to prevent the free or practically free import into Germany of French iron after Jan. 10, when the existing French treaty privilege in this matter expires. At a meeting of the Association of Smelters General-Director Dr. Voegler declared it a mistake to speak of overproduction of iron and steel. The real problem is not to reduce production permanently, but to revive the former consuming markets, especially those of East Europe. For this, long-term credits must be granted.

After a slight rise in prices in November a brief period of stability followed, but in the last few days there has been a considerable new all-around rise. Steel scrap led the way, and is now 72 marks per metric ton. Following are prices in marks per metric ton ex-works on Dec. 12:

Ingots	102	or $24.68 per gross ton
Blooms	108	26.14
Billets	115	27.83
Slabs	122	29.52
Wire rods	145	35.09
Bars	127.50 to 130	or 1.39c. to 1.41c. per lb.
Structural forms	122	1.30c.
Universal iron	135	1.46c.
Bands	155	1.67c.
Thick sheets (over 5 m.)	148 to 150	1.60c. to 1.62c.
Medium sheets (3 to 5 m.)	175	1.89c.
Thin sheets (1 to 3 m.)	205	2.22c.
Thin sheets (under 1 m.)	220	2.38c.

All these prices are well over November average rates. The periodical *Wirtschaftskurve*, published by the *Frankfurter Zeitung*, prints a comparison of present prices of iron and steel finished goods with their pre-war prices. On the whole, metal goods have risen much less than others, in particular textiles, some kinds of which are 170 per cent higher than in 1913, whereas no article constructed mainly of metal has risen 100 per cent. Taking 100 as index number of prices in August, 1914, present index numbers (Nov. 1) are:

Motor cars	198.84	Steam boilers	120.18
Motors	150.00	Sheets	110.51
Bicycles	137.70	Planes	195.76
Typewriters	140.95		

The increase in activity in iron and steel was marked at the beginning of December, since when the improved level has been maintained, but the market has been quiet. The greatest demand is for thin sheets, for which the Siegerland works have orders for three months ahead, and here the tendency of prices is strongly upward. Foreigners also are buying actively at around £9, f.o.b. Rotterdam. Big home orders for bars have been received, the delivery term being about the same. South America and the Far Eastern countries have given considerable orders, rates being around £6 2s. 6d. per ton, f.o.b. Rotterdam. The pig iron market is quiet, and prices, except in South Germany, where there has been a slight rise, are stable. Views as to the condition of the market early next year are optimistic. The building market has revived, and is expected to revive further, and large quantities of steel will be required for railroad repair and construction purposes.

In the first ten months of 1924 coal output in the whole republic (Saar excluded) was 96,908,115 metric tons, against 52,489,641 tons in the same months of 1923, and 118,885,238 tons in the same area in the same months of 1913.

Foreign trade in the first ten months of 1924 was:

Metric tons	*Imports*	*Exports*
Iron ore, manganese ore, etc.	1,415,218	242,848
Coal	10,911,735	1,267,985
Coke	309,499	497,427
Machinery	9,429	217,042
Iron and steel and wares other than machinery	932,940	1,336,728
Whereof:		
Pig iron	186,624	38,763
Scrap iron	25,363	320,112
Ingots, blooms, etc.	88,846	13,099
Bars, girders, etc.	324,876	149,362
Sheets	78,118	134,525
Wire	36,952	114,175
Rails, ties, etc.	111,989	16,637

Prospects in the automobile business are good. The use of motor-driven vehicles, though small compared with that of the United States or even of France or England, is rapidly increasing, and there is a growing demand for light, cheap cars. The following shows the number of motor vehicles in use (including motorcycles) in the last ten years (on July 1):

1914	1922	1923	1924
84,682	165,729	212,949	293,188

In use are 97,965 motor-cycles. At the close of 1923 Germany had one motor vehicle per 360 inhabitants, against one per seven in the United States.

The Trend in Metallurgy Last Year

Technical Developments in Steel, Cast Iron and Alloys—Larger Open-Hearth Furnaces—Progress in Research

BY C. E. MAC QUIGG*

IN preparing a review of this kind one is always confronted with the critical task of attempting to pick out those items of the technical news which will most clearly portray the current advances in iron and steel technology and, if possible, indicate the general direction in which future developments may be expected. The year 1924 does not appear to have been distinguished by many new or startling technical developments. The commercial developments, which are much more striking, are discussed elsewhere in this issue. In what follows the effort has been made to concentrate in a brief space such literature as appears to be most suggestive along technical lines.

Iron and Manganese Ores

A well-posted writer has recently discussed[1] the increasing practice of importing foreign ores into this country. While we have within our own borders almost unlimited iron resources, so that no fear need arise of a shortage in a national emergency, still certain economic factors now obtaining make it profitable to import much iron ore from outside our own borders. Briefly, the factors are: (a) About one-third of the cost of Lake ore at southern lake ports is due to freight. When this is further increased by reshipment to Eastern furnaces, foreign ores have an easy price differential in their favor. (b) Ocean freight rates are now at pre-war or lower levels, while the internal (rail) rates are higher. (c) It is said that foreign ore may be loaded into the cars at Philadelphia or Baltimore as cheaply as Lake ore may be placed at lower lake ports and that the rail rate from tidewater to Eastern furnaces is 80c. to $1 per ton, as against $2 from Buffalo to the same destinations. (d) Low phosphorus content of certain foreign ores has stimulated their consumption.

As regards distribution of source, Chili, Sweden and Cuba furnish most of that imported, with somewhat lesser amounts from Spain and French Africa. While the total tonnage imported during 1923 was only 2,786,430 tons, a very modest portion of our total iron ore consumption, the trend is nevertheless quite interesting and serves to recall the statements of Mr. Schwab, made in 1913, that Chilean ore containing 68 per cent iron could be placed in Bethlehem for 6c. per unit or $4.08 per ton.

The prediction[2] has been made that Panama will have to be reckoned with as a producer of manganese ore. At present, detailed information is lacking as to the extent of these deposits, which are in lenses and floes, and until further exploratory work is done the probability of large future production will be discounted.

Better Utilization of Fuel Resources

The subject of fuel and its utilization has remained well to the front in 1924 engineering. The World Power Conference held at Wembley last summer produced papers of interest to the iron and steel metallurgist. To more than touch upon some of the several very interesting ones here is impossible.

The concern of a people in processes for converting coal into liquid fuels is an inverse function of their natural oil supplies. In this country the subject may well wait upon a much greater price differential before it becomes of wide technical moment. However, on the continent, the matter has already become a subject of active experimentation in some of the newer aspects Three methods have been outlined.[3] These are:

> Destructive distillation in which the high temperature carbonization, yielding more of the heavy tars used in the organic (coal tar) and dye industries, is replaced by a low temperature distillation which yields a larger quantity of the oils suitable for fuels. (It may be remarked in passing that the time does not yet appear to be ripe, in this country, for the commercialization of low temperature carbonization because the market is not yet ready for the liquid fuel and the gas. That this is the real goal of low temperature carbonization, rather than smokeless domestic fuel, has been stated by those well informed, although in England the situation is apparently different.)
>
> Hydrogenation, differing from destructive distillation, may yield, in some cases, up to the weight of the original coal in oil. The Bergius process, mentioned in a previous review, subjects the coal at high temperatures to hydrogen under pressure with resultant liquefaction and production of an oily or tarry mass. Fischer showed that the treatment of coal by sodium formate at 400 deg. C. or by carbon monoxide at high pressures (2100 lb. per sq. in.) was able to produce tar and oils.
>
> Possibility of synthesizing water gas by a contact process into a low boiling point oil.

While these processes have not progressed beyond the laboratory, they indicate what may be expected from the organic chemist when once it is necessary for him to supply a demand for internal combustion engine fuel, which latter may be about to receive as much impetus from the gas turbine as was imparted by the Diesel engine. An American manufacturer[4] has announced the perfecting of double acting Diesel engines in larger units, while the gas turbine has made a start toward commercial practicability, if recent reports from Germany[5] are to be accepted without reserve.

The outlook for the low temperature carbonization of fuel in this country, as viewed by advocates of the high temperature by-product recovery process, has been stated in two interesting and exhaustive papers.[6] The conclusion is drawn that under the present conditions low temperature carbonization of coal cannot compete with high temperature methods, using coking coals. With coals which are difficult or impossible to coke in the by-product oven, low temperature carbonization will have a better chance to compete. An interesting question raised in the papers mentioned is that of the use of coke for power generating purposes. The time when all fuel burned in power and metallurgical plants is first coked or partly coked waits partly for an enhanced value of the by-products (gas and tars) and partly on the complacence of the public toward the smoke evil. It can be safely assumed that cokes can be made to function as efficiently as higher volatile fuels by adjustments of furnace design.

Technical Developments and the Blast Furnace

Although several excellent papers[7] of a descriptive nature on the iron blast furnace have appeared during

*Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.

1924, there does not seem to have been much new in practice developed.

Some data on the effect of sulphur account for its distribution per ton of pig made, in an average charge, as follows: 19.9 lb. or 92 per cent with the coke, 1.38 lb., or 7 per cent with the ore and 0.33 lb., or 1 per cent with the stone. Of this, 86.7 per cent is removed by slag and 4.63 per cent of the total charge sulphur enters the pig. Because of the requirement for limiting sulphur in the pig iron, the sulphur elimination is through the slag, which must be increased in volume to take care of this requirement; this in turn boosts the fuel consumption so that it figures out that about 150 lb. of extra coke are required to eliminate the sulphur in the coke itself. With a 1:1 coke ratio this is equal to a loss in tonnage of 7.5 per cent.

Properties of Cast Iron

A fact often lost sight of is that the tensile strength of cast iron depends on the condition of the carbon in the alloy, i.e., whether the free graphite is fine or coarse grained, and this in turn depends on both the rate of cooling and the composition. With castings of a given composition, the rate of cooling depends on the thickness of section. Willard Rother[8] has published some results which, although they are not sufficiently comprehensive to serve as a basis for calculations of design, nevertheless show nicely the effect of decrease of unit stress by increase of casting section. For example, the figures show the following relationship:

Thickness of Cast Iron in Inches	Max. Stress, Lb. per Sq. In.
1	33,700
1.5	29,250
2	26,300
2.5	22,550
3	13,600

While this reciprocal relationship is thoroughly known to engineers, it is often overlooked in design where unit stresses are figured constant through changing cross sections.

Particularly timely inquiries[9] have been made on the effect of repeated heatings and coolings on the properties of cast iron, timely because of the bearing on Diesel engine design and manufacture. Readers of THE IRON AGE, at all conversant with the subject of power generation, will have noted the greatly increased use of the Diesel engine as a prime mover. Not long since a well-known naval constructor remarked to the writer that the day of the steam engined ship was passing and that the coming unit for smaller plant power generation on land seemed to be the internal combustion engine of the Diesel type. While the statements of those enthusiastic for this type of engine must be taken with due reserve, nevertheless the Diesel engine is being made in greater number and in larger units than ever before. Since cast iron, largely used in cylinder parts, undergoes temperature changes, the knowledge of these changes is important.

When heated to relatively low temperatures, cast iron loses an appreciable proportion of its tensile strength and shock resistance. This deterioration is a heat treatment effect, a function of the time and temperature to which the specimen is heated. It is manifested because the combined carbon (pearlite) is broken up and precipitated as graphite with consequent reduction in tensile strength and resistance to shock.

This annealing effect may be manifested at temperatures as low as 500 deg. C. (932 deg. Fahr.) if the time of anneal is prolonged to 24 hr. With higher temperatures shorter times suffice, e. g., 650 deg. C. (1202 deg. Fahr.) and 3 hr. The completeness of the breakdown to graphite will depend on the chemical composition of the cast iron, particularly its silicon content.

An investigator who has reported his results to the West of Scotland Iron and Steel Institute made a series of tests on cast irons in which the samples were heated to given temperatures, held 8 hr. at that temperature, and cooled. This was repeated for 5 days or a total of 40 hr. at the given temperature. This procedure was repeated until the last specimen had been treated 200 hr. Samples were tested to determine strength and the degree of graphitization which had occurred after each 40-hr. period. Other groups were tested similarly at other temperatures, the range embracing 450 to 600 deg. C. (842 to 1112 deg. Fahr.). Good quality cylinder iron was used for the tests; some tests were also made on the effects of chromium and nickel. The conclusions confirm the work of previous investigators, viz., repeated low temperature anneals reduce the tensile strength and hardness, the effect increasing with increase of temperature; manganese makes the carbide more stable; chromium is more effective than manganese in stabilizing the carbides and preventing deterioration of physical properties, while nickel was not found to be helpful in that respect.

Growth of various cast irons containing alloying elements, on repeated heating and cooling, was found[10] to be greater with nickel and aluminum and less with chromium, because of the effects on the stability of the carbides and not on oxidizing properties, as has been stated elsewhere.

The blind following of engineering formulæ, some of which are very old, will result in serious errors[11] when applied to the breaking strength of cast iron, as has been shown in some tests made in England. It is necessary to take into account the structure and casting conditions of the test bars.

Larger Open-Hearth Furnaces

An excellent study, combining the technical with the practical side of the question, has been made on the utilization of waste heat in the open-hearth process.[12] The findings were reported in a paper read before the Iron and Steel Institute of Great Britain last spring. The investigator has summed up his conclusions and from among them the following facts stand out:

1.—Of the total heat in the fuel, only about 8 per cent is actually used in the bath with hot metal, and only 10 to 15 per cent with cold pig.

2.—The waste gases from the checkers contain about 43 per cent of the total heat value of the fuel and by the use of waste heat boilers about 25 per cent of the total heat value of the fuel can be recovered.

3.—Further improvements in checker chamber heat insulation, together with less heat loss through valve-cooling water, the heat saved by raising steam is boosted to 34 per cent of the total.

4.—As a further step, a part of the gas may be taken direct from the reverberatory to the waste heat boilers and the superfluous gas preheating checkers (in the case of producer gas-fired furnaces), may be eliminated, thus sending more heat into steam raising, so that the heat saved may be as much as 40 per cent of the total.

5.—Practical methods of effecting other improvements are considered.

The discussion at the meeting, too full to abstract here, brought out several important considerations in open-hearth design and operation. Benjamin Talbot, who is well known for his work here and in England, mentioned that furnaces as large as 400 to 500 tons capacity were not considered short of an almost certainty. He gave an indication that such a size was well on the road to actual operation—a furnace which tilted endwise and had a uni-directional flow of gases. High pressure, high velocity flames versus maintenance costs were also discussed.

Is it not true that the open-hearth process, while intrinsically and of itself using little heat in the actual reactions, must, however, use this relatively small

amount of heat at a very high potential? The problem is then so to develop refractories and furnace design that this heat may be "stepped down" to useful levels with the minimum of waste, thus using a larger proportion of what has formerly been allowed to go to waste.

From time to time changes of design are noted in open-hearth ends, the present aim being toward the attainment of higher flame velocities with the result that more efficient combustion and faster driving may be obtained. The Moll[13] end, a German development, mixes the gas and air well back from the port and directs the premixed gases down on the bath to induce maximum "turbulence" in the flame. It is said that the design results in a saving of 60 to 70 per cent in construction material, greater ease of repairs and increased production. Pre-ignition and consequent heating of the leading-in flue is controlled by varying the velocity of the gases and hence the diffusion, also by design of the port end to effect more or less choking action.

Steels and Miscellaneous Developments

There does not seem to have been any strikingly new development in alloy steels. Woolwich Arsenal[14] published the result of tests made on manganese steels, varying in manganese from 0.25 to 5.25 per cent. These were variously treated and tested for mechanical properties. The conclusions may be summed up by stating that where increased strength over that obtainable in a plain carbon steel is required, a steel may be used with 0.35 to 0.40 per cent C. and 1.8 to 2.2 per cent Mn. These should be hardened from 800 to 850 deg. C. (1472 to 1562 deg. Fahr.) and drawn at 610 to 650 deg. C. (1130 to 1202 deg. Fahr.). Cool from the draw in air, oil or water. This is a somewhat higher manganese than the one which has been used somewhat extensively in this country of late for locomotive heavy forgings.

The necessity for accurate control of quality in large scale production of heat-treated parts has continued to have its effect on industry, particularly in automotive manufacture where it is necessary to devise special equipment to handle heavy parts. This has been done at the new heat-treating plant of one of the larger automobile manufacturers, where the design of the axle hardening unit is noteworthy.[15] The cold axles are fed into the furnace, which is oil-fired, by means of a spacing device which assures even distribution along the hearth. The axles, extending at right angles to their direction of travel, are moved through the furnace by means of a hearth which has an up and down, as well as a forward movement, imparted by cams. The axles, resting on piers, are picked up and carried forward at each movement of the hearth, which is at rest below the level of the piers. As the last axle is "stepped off" the discharge end of the piers it is received by fingers which drop it uniformly into the quenching oil. The fingers are counterweighted to return at once to their normal position in the heated zone of the furnace, thus avoiding the work being unevenly hardened by contact with cold metal as it enters the bath.

Mechanical handling through the drawing furnace is effected by a radial blade type of conveyer. Provisions for oil storage and cooling, furnace temperature control by pyrometer, oil cooling facilities and 100 per cent Brinell inspection of all treated axles, make an installation which leaves little to the hazard of the personal element.

Another[16] installation for obtaining uniformity of product is that of an electrically heated annealing furnace used by a manufacturer of tool steel, because "in the face of the demands of the present time for economical production quality of tool steel is assuming a new importance." The furnace in question has a hearth 32 in. wide inside, 26 in. high and 16 ft. long, the bars being packed in a container 12 in. square by 14½ ft. long. The furnace is heated by metal resistance strips and is heavily insulated by non-conducting brick and powdered heat insulator. Metal resistance strips are used for heating elements and the current is derived from high voltage which is transformed in multiple tap transformers. Pyrometer temperature control is installed to make the equipment as nearly automatic as possible. The initial trial installation was so successful in producing a uniform product, free from forging strains, that other units have since been installed.

Losses from Corrosion

The figures which have been published on the corrosion losses of iron reach truly staggering figures and when contrasted with the yearly pig iron production are seen to represent a considerable proportion of the yearly tonnage made.[17] For example, since the year 1906, when the yearly loss reached 20 million gross tons, the weight of metal wasted has steadily increased to 30 million in 1916, then to a peak of 33 in 1919 and 1920, dropping slightly to 31 million tons for 1921, 1922 and 1923 respectively. The relative weight of these estimates is better grasped when contrasted with the yearly pig iron production for the given years; the gain of iron produced over iron lost was a maximum in 1913 (a banner year for the world's production of pig iron), and a minimum for 1921, a year of low production. The surplus tonnages are 54 and 4 million gross tons respectively. These statistics, if only approximately indicating the correct ratio of loss to production, set forth the colossal price mankind is paying in human effort and natural resources to replenish the drain and must at the same time speed the work of those who are trying to devise either new alloys to increase resistance or better to conserve those already in service.

Evidence that engineers are taking cognizance of the importance of corrosion is seen in the holding of a symposium last June by the American Society for Testing Materials at its Atlantic City meeting, and by the American Electrochemical Society in October at Detroit, at which times the information available on the subject was summarized in a number of papers. A joint symposium of the former society and the American Society of Mechanical Engineers was held somewhat earlier in the year at Cleveland for the purpose of discussing the properties of metals and alloys at high temperatures.

Corrosion resistance and stable properties at high temperatures will continue to receive more and more attention because of increasing industrial demand for material of this nature. One of the papers at Atlantic City announced a new type of Admiralty bronze with high tarnish resistance and excellent working properties. The commercial production of seamless tubing in an oxidation resistant alloy opens up new possibilities for the construction of pressure stills and allied uses.

Progress in Research

Research is steadily becoming more widely established in the iron and steel industry. A number of steel foundries are maintaining the Electric Steel Founders Research Group.[18] Although the various members of the group have no ownership connections and are actually competitors in their line, each member plant conducts investigations on such details as pattern and flask equipment, molding sand and details of mold design, casting methods, etc., as well as items involving plant management. Resident research men at each plant are supervised by a director who visits all of the member shops. Results of the investigations

are communicated to the executives of the member establishments. Foremen and managers at each place have the privilege of mutual plant visits for the purpose of getting first-hand information on subjects under investigation. The spirit of cooperation engendered among those engaged in exchange of ideas is said to be contagious, the result being that the morale of the individual plants is vastly improved in the effort to compete in quality and low production costs. This scheme, which at the time of its inception was considered pioneer in scope and detail, has been in vogue for more than four years, and is said to be giving satisfaction.

Many activities of the industry, similar in aim but differing in detail, might be enumerated. The Association of the Manufacturers of Chilled Car Wheels has undertaken research work to clear up by actual test questions involving phases of their business. No less a representative body than the American Society for Testing Materials has this year got behind organized research to the extent of announcing a committee which will supervise or advise research activities which may be referred to it.

Pressure and Speed in Rolling Mills

The relationship between pressure, angle of grip and peripheral speed in rolling mills is such[19] that, although the roll speed may be increased to pass a section of given length through the rolls in a shorter time, still the reduction in the gripping capacity of the rolls is such as to require a lowering of roll pressures and hence a greater time for the complete rolling of the bloom or billet than would be the case with slower peripheral speeds. Danger of "jolting" above certain speed limits is more evident. The best speeds depend on such factors as material, size of rolls and size of ingots, billets or blooms and the nature of the roll surface. Speeds in the neighborhood of 5 ft. per sec. are recommended for average sizes.

Clink Detector for Forgings

Many times forgings are rendered useless by reason of cracks which have developed during the process of fabrication, either in the period of heating during working or when the forging is subsequently cooling down. At times the development of the crack or fracture is accompanied by a decided noise or snap, thus fortunately evidencing the presence of what may be a dangerous flaw. At other times the flaw may be undetected and result in putting into service an unsuitable article.

A new device has been brought out by a reputable firm of instrument makers,[20] working in conjunction with the shops of a large manufacturer of turbines. The device is called a "clink detector," so named because of the metallic clinking noise emitted when a forging fails from the causes mentioned. Depending on vibrations set up in the solid, rather than by any noise emitted if failure occurs, this instrument registers by means of a chart the life history of the forging. The appliance consists of something analogous in principle to the seismograph, is rugged and portable. It is affixed to the forging-roll, gun tube, etc.—and if cracking occurs the piece can be discarded, thus often saving expensive machining work or more important, can be a means of detecting unsafe material.

As an example the occurrence of a crack 3/16 in. wide was indicated in the middle of an ingot 8 ft. x 3 ft. 6 in. x 2 ft. 3½ in. as revealed by cutting open after cooling the ingot. Because of the reputation of its sponsors, it is assumed to be a practical device. If its performance lives up to expectations it would seem to be a boon to forging shops, and it is not hard to imagine even wider uses.

During the World Power Conference[21] at Wembley last summer a paper on electrolytic iron summarized the three chief systems which have been worked out so far. These are called the American, English and French, and are respectively: (i) Insoluble anodes with the iron replaced in the solution from recuperators, (ii) Soluble anodes consisting of scrap or ore, or both, (iii) Soluble cast anodes, the iron in solution coming from these and from recuperators. During the discussion it was stated that electrolytic iron was an assured commercial possibility, but that it would probably not be a serious competitor of ordinary iron for many years.

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The Ferroalloy Industry in 1924

Technical Developments in the Various Alloys—Market Conditions—Special Alloys and Steels

BY ROBERT J. ANDERSON* AND LAURA D. ANDERSON†

As was expected at the outset of 1924, the ferroalloy trade in the past year was good but not exceptional. There was a considerable curtailment in several lines as compared with 1923. Lowered consumption of the major steel-making alloys was, of course, due to slackening in the steel trade during the past summer, but 1925 should see output at increased levels in all branches.

The import-and-export trade in metallurgical ores and ferroalloys was, on the whole, fairly satisfactory. In mining, the production of ores of ferroalloy grade was generally at an increased rate over 1923, despite less consumption of the alloys, and this is due to the fact that old stocks have been just about cleaned out in all lines and ore producers expect increased consumption in 1925. Manganese ore production in the United States was increased moderately in 1924 over 1923, and tungsten-ore mining has been resumed.

The production of alloy steel in 1923 was the highest in the history of the industry, and while the output was less in 1924 the indications are that the consumption of special and alloy steels is bound to increase still more, so that the future consumption of the ferroalloys will be on the upgrade. The production of motor cars and trucks in 1924 was at the rate of 3,800,000, as against 4,014,000 in 1923, and the consumption of structural alloy steels and of high-speed tool steels for machining was at a lessened rate last year. The new unit of the Dominion Alloy Steel Corporation at Sarnia, Ont., is under way, this having a capacity of 40,000 to 50,000 tons of alloy and fine steel per year.

Markets and Trade

Selling prices for ferroalloys in 1924 were, on the whole, lower than in 1923, but the markets strengthened at the close, indicating higher prices for 1925. The British ferroalloy situation was only fair last year, and its exports of ferromanganese to the United States were only about half those in 1923—this owing largely to the high domestic import duty. Ferroalloy production in France, Italy, Sweden and Switzerland was doubtless increased in 1924 over 1923, but the German industry continues to be poor. In Russia, the manganese ore mining industry is at length getting on a better basis, and production in 1924 was markedly increased over the preceding year. The reduction in prices of British ferroalloys in September was probably due to dissension among associated producers, and it did not have the effect of stimulating business. Several new blast furnaces are being built in England and the Government has a program for new warships, and these factors should result in an increase of business. The demand for French ferroalloys has been good because of the depreciation of the franc, and evidently French ferroalloy makers have been neglecting home consumers in selling abroad.

The domestic tariff situation continues to be generally unsatisfactory. As stated in this review last year (THE IRON AGE, Jan. 3, 1924, p. 94), the import duties, as laid down, have not served to stimulate domestic production of metallurgical ores—which cannot be produced except under heavy tariff protection—but the duties have had the effect of raising prices. The report of the sub-committee on magnanese of the committee on foreign and domestic policy of the Mining and Metallurgical Society of America stresses the total inadequacy of our domestic resources of manganese ore and very properly points out that the country should be led in the direction of conserving its resources of scarce and valuable minerals. Naturally, this cannot be accomplished by a high tariff. A tariff on manganese and tungsten sufficiently high to be effective in forcing the use of low-grade domestic ores would be so costly to steel producers as to be unreasonable and not at all justified.

Technical Advances

Continuing as in recent years, much work is going on in the development of processes for the production of better grades of ferroalloys, and the interest in the stainless varieties of irons and steels has been well sustained and active. Better grades of ferroalloys are being demanded because better grades of alloy steels are being made and demanded, and the great growth of the alloy steel industry has been largely responsible for many of the metallurgical developments in the ferroalloy end. Of course, it should be said in all fairness to ferroalloy makers that some of them have been most progressive in a technical way, and some of the special alloy steels have been due in large part to the development work of ferroalloy producers.

The work of Becket on zirconium may be mentioned in this connection. As stated, the alloy steel industry has greatly expanded in recent years (E. F. Cone, THE IRON AGE, Sept. 11, 1924, p. 618), and two important reasons for this are the use of heat-treated electric alloy steel castings in place of ordinary forgings and the production of manganese steel castings in the electric furnace instead of the convertor. In the past few years, several plants have been put in operation for the electric production of manganese steel castings.

There is an increasing use noted of alloy steels in locomotive work for the reduction of weight in reciprocating parts, and this will eventually mean much to the ferroalloy industry. In Bulletin 212 of the U. S. Bureau of Mines, Moore *et al.* describe analytical methods for the determination of cerium, molybdenum, tungsten, uranium, titanium, zirconium, vanadium, etc., and this is an important contribution to the chemistry of the industry.

In the past year, the Federal Specifications Board issued a number of specifications for metallurgical ores and ferroalloys to govern purchases by Government establishments. These became mandatory on Aug. 1, 1924, and include the following: Manganese ore, No. 142; ferromanganese, No. 138; ferrosilicon, No. 145; chromite, No. 125; ferrochromium, No. 139; ferrovanadium, No. 135; ferromolybdenum, No. 143; and ferrotitanium, No. 144. These various specifications can be obtained through the U. S. Bureau of Standards.

Special attention should be directed to the work of the Electro Metallurgical Corporation on the effect of zirconium in steel and to papers before the American Institute of Mining and Metallurgical Engineers by Field. It is shown that zirconium counteracts the harmful effects of high sulphur in steel and permits such steels to be readily rolled. Very many special alloys and alloy steels high in chromium are being brought out for oxidation, corrosion, and heat-resisting purposes, and alloy cast irons are coming in for further attention. It should be added that considerable work is being done on the production of

*Consulting metallurgical engineer, Boston.
†Librarian, Arthur D. Little, Inc., Cambridge, Mass.

alloy steels directly from ores, thus obviating the use of ferroalloys.

Ferromanganese and Spiegeleisen

Manganese ore production in the United States in 1924 was higher than in 1923, on the basis of preliminary figures, the output of 35+ per cent ore being probably 40,000 gross tons*, as against 31,500 tons in 1923. Imports of high-grade ore were about 260,000 gross tons, as compared with 206,048 tons in 1923. Imports came largely from Brazil, the Caucasus, and British India.

The largest and most modern manganese washing and concentrating plant yet to be built in the Batesville-Cushman field in Arkansas has been completed by the American Manganese Co., on its Polk-Southard property. The capacity of this plant is 600 tons per 10 hr., and the ore is being concentrated to 50 per cent grade by log washing, screening, and jigging. The S. S. Warren manganese property near Deming, N. M., has been shipping ore at the rate of about 500 tons per month, and a concentrating plant to handle 100 tons daily is contemplated.

Statistics recently made available as to manganese mining in Russia show that the situation is now much better than it has been for years. Thus, the production in 1924 was at the rate of 410,000 tons, as against 320,185 tons in 1923, and only 88,711 tons in 1922. American interests represented by W. A. Harriman & Co. negotiated with the Russian Soviet Government for a 25-yr. contract to control the mining and exportation of the Caucasian ores, but this deal fell through—it being claimed that the Soviet organization was unwilling to grant this concession because the United States has not recognized the Russian Government.

A geology committee has recently investigated the mineral resources of the Ukraine, and in the Kheshtshevatski district a deposit of manganese ore 35 ft. thick and extending over a considerable area has been discovered. The manganese deposits of Panama are being operated by the American Manganese Mfg. Co., and these ores are discussed in an interesting article by Sheridan (THE IRON AGE, Aug. 21, 1924, p. 444). Panama ore should evidently become an important factor in the domestic market.

The domestic output of ferromanganese in 1924 is estimated at about 200,000 gross tons, as compared with 246,231 tons in 1923, while the spiegeleisen production in 1924 was around 110,000 tons, as against 130,585 tons the preceding year. Imports of ferromanganese into the United States were about 40,000 gross tons in 1924, as contrasted with 91,066 tons in 1923, while the exports in 1924 were about 3800 tons, as against 4295 tons in 1923. Domestic ferromanganese opened the year at $109 to $110 per gross ton, furnace, for the 80 per cent alloy, declined slightly in February, dropped to $90 to $95 in August, and closed at $105 to $110. The English alloy opened at $110, seaboard, duty paid, declined to $100 in August, and closed at $110 per ton. Spiegeleisen, 19 to 21 per cent grade, opened at $38 to $39 per gross ton, furnace, declined to $32 to $33 in August, and closed at $33 to $35. The 16 to 19 per cent alloy opened at $37 to $38 per ton, declined to $31 to $32 in August, and closed at $32 to $34.

The claim of the Anaconda Copper Mining Co. for reimbursement from the Government for expenditures on its ferromanganese plant at Great Falls during the war was found invalid by the War Minerals Relief Commission. The use of 1.6 to 1.8 per cent Mn steel in locomotive construction is increasing, and considerable experimental work is being done in this direction by the American Steel Foundries (E. F. Cone, The IRON AGE, Oct. 2, 1924, p. 824). Hall and Hanks (paper before Am. Soc. for Test. Mats., June, 1924) discuss the manufacture and properties of cast 12 per cent manganese steel. The two blast furnaces of the American Manganese Mfg. Co. at Dunbar, Pa., which have been idle for some time, were taken over by the bondholders of the company in a receivers' sale. The Ferro Manganese Co., San Francisco, has been incorporated to handle manganese ores and products. This company owns deposits in Stanislaus County, Cal., and a plant is being built at Berkeley.

*All figures for production, imports, and exports of ores and alloys for 1924 are estimates based on preliminary statistics.

Ferrosilicon

Production and consumption of all grades of ferrosilicon were lower in 1924 than in 1923, owing largely to the falling off in steel ingot output. About 90 per cent of the steel made is deoxidized with ferrosilicon, and any drop in steel production is immediately reflected in the ferrosilicon market. Imports of ferrosilicon into the United States in 1924 were at the rate of 10,000 gross tons, as against 11,550 in 1923, while exports were about 900 tons, as compared with 714 tons in 1923. Prices for the Bessemer grades of ferrosilicon were as follows last year: The 10 per cent grade opened at $41.50 per gross ton, f.o.b. maker's plant, rose to $42.50 in February, and declined to $39.50 at the close; the 11 per cent grade opened at $44, rose to $45, and declined to $42 at the close; while the 12 per cent grade opened at $46.50, rose to $47.50, and declined to $44.50 at the close. Electric-furnace ferrosilicon, 10 to 12 per cent, opened at $43 to $50, delivered, was quoted at $41.50 to $46.50 in February, declined to $39.50 to $43.50 in July, and held there until the close of the year. The 50 per cent grade opened at $75 per ton, delivered, dropped to $69 in July, and closed at $72 to $75. Prices for 1925 advanced to $82.50 per ton, delivered Pittsburgh.

Technical advances in ferrosilicon and silicon alloys were few during the past year, but considerable work is being done on the production of high-silicon (13 to 15 per cent Si) iron castings. It is of interest to call attention to the new specifications for rails for the Belgian State Railways; these call for a silicon content of not less than 0.25 per cent.

Ferrochromium

Chromite mining in the United States is still dormant, and the Canadian output is quite small. The principal producing countries in 1924 were Rhodesia, New Caledonia, India, Greece, and Cuba. The United States continues to be the chief consumer of chromium products. In a bulletin (World Trade in Chromite, U. S. Department of Commerce, *Trade Information Bulletin*, No. 252, Aug. 11, 1924), Hoar discusses the growth of British dominance of the chromite industry and directs attention to the damage that might be done American consumers by monopoly of supplies and restriction of imports. The Chrome Co., Ltd., of London, controls the world trade in Rhodesian chromite and is an important factor in the Indian market.

Preliminary figures indicated that the 1924 Rhodesian output of chromite would be larger than any hitherto. Indian chrome ore, 48 per cent Cr_2O_3 basis, sold around $19.50 per ton, c. i. f. Atlantic port, all year. Rhodesian and New Caledonian ore sold at $21 to $24 during the year. Ferrochromium, 60 to 70 per cent Cr and 4 to 6 per cent C, opened at $0.11 to $0.12 per lb. of contained Cr, declined in February to $0.10¾, and was steady at this price all year. The 1 to 2 per cent C grade sold around $0.30 during the year.

The history and developments of ferrochromium are discussed in an article by Frederick M. Becket in his address when presented with the Perkin medal in 1924. The demand for very low-carbon ferrochromium for the production of stainless iron is increasing, and such an alloy containing less than 0.10 per cent C is now being marketed. Electric furnace chromium containing more than 98 per cent Cr and less than 1 per cent Fe is being regularly made.

Stainless Products

Interest in stainless steels and irons has continued unabated, and many patents covering high-chromium alloys of one sort or another have been taken out in the past year. Chromium plating is also attracting much attention. Numerous papers have appeared dealing with the stainless products, and not even a brief review of the subject can be given in the space available here. MacQuigg (Am. Soc. for Test. Mats., June, 1924) discusses the engineering applications of the

high-chromium alloys, and Parmiter (paper before Am. Soc. for Steel Treat., October, 1924) discusses the manufacture, properties, and heat treatment of stainless irons and steels. Tests have shown that stainless steel is not suitable for ball bearings, owing to its low carrying capacity.

Stainless steels have been found unsuitable for aircraft engine valves, but certain cobalt-chromium and silicon-chromium steels have given fair performance. Stainless steel has been tested for ships' bottoms, and while it does not corrode in sea water it fouls as badly as mild steel.

Ferrotungsten

Very little mining of tungsten ores was done in the United States in 1923, although two or three concentrating plants turned out a small tonnage of concentrates. The Wolf Tongue Mining Co. and the Vasco Co. operated in Colorado in 1924, while the Atolia Mining Co. in California re-opened its mine and leased certain portions to miners. Properties have also been opened up in Nevada again. In the main, domestic consumers of tungsten have been using ore brought in from China and elsewhere before the passage of the tariff act of 1922. The tariff has been quite ineffective in re-establishing the domestic mining industry, but stocks have now been cleared out, and a small increase in the American output may be expected.

China, however, still rules the world's tungsten markets, and so far the Chinese civil war has not seriously interfered with production or shipments. China's output last year was probably about 4,000 tons. Evasion of the tungsten duty has been growing; this is accomplished by importing tool-steel scrap, the tungsten content of which is utilized in high-tungsten steel manufacture. Scrap steel carries a duty of $0.75 per ton, while that on tungsten is $0.72 per lb. This loophole was overlooked by the tariff committee. Wolframite opened at $8.50 per unit, for 60 per cent concentrates, rose shortly to $9 to $9.25, dropped to $8.50 to $8.75 in August, and remained at this price until the close. Scheelite opened at $9.50 to $10, dropped to $9 in August, and sold at $9 until the close of the year.

Progress has been made on the Rand and elsewhere in using high-speed steel for rock drilling—the drilling bits being welded to carbon steel shanks. The cost for drilling with tungsten steel is reported to be less. Gordon and Spring, in a valuable article (cf. *Journal of Industrial and Engineering Chemistry*, vol. 16, 1924, p. 555), described in detail the continuous process used by the General Electric Co. for the production of sodium tungstate and tungstic acid from wolframite. Ferrotungsten opened at $0.85 to $0.90 per lb. of contained W, rose shortly to $0.90 to $0.93, and closed at $0.87 to $0.90.

Ferrovanadium

The mining of both vanadium and uranium ores in the United States has been reduced to a very small industry. Vanadium ores have been produced in this country almost entirely as a by-product of radium manufacture, and since the newly exploited uranium deposits in Katanga, Belgian Congo, are dominating the world's radium market, as do the Peruvian deposits of vanadium the vanadium market, mining of both uranium and vanadium ores in the Unted States has been largely stopped.

Vanadium ores are discussed in a recent bulletin of the Imperial Institute, which gives considerable information on the world's sources of ores; the important Peruvian deposits are, however, treated very briefly. Doerner (*Chemical and Metallurgical Engineering*, Sept. 15, 1924) discusses experiments made on the extraction of vanadium from vanadiferous sandstones of Garfield County, Colo. Fair results in extraction were obtained by roasting followed by hot-water leaching, but the best results by any method of treatment fall short of commercial requirements. The Vanadium Corporation of America planned production of 1000 tons of concentrates per month during 1924 at its Peruvian properties.

Vanadium is being used in practically all high-speed steels, and there may be a considerable increase in the use of vanadium steels for locomotive work. In an experimental locomotive of mountain type, the main and side rods, crankpins, piston rods, driving and trailing rods were made of carbon-vanadium steel, with considerable saving in weight. Vanadium concentrates, minimum 50 per cent V_2O_5, sold at $1.00 to $1.25 per lb. all year. Ferrovanadium, 30 to 40 per cent, sold at $3.50 to $4.00 per lb. of contained Va during the year. The British alloy fluctuated in price over a considerable range.

Ferromolybdenum

The status of molybdenum mining has remained the same for the past three years—stocks of ore on hand have prevented the resuming of mining operations. Small tonnages of concentrates are being produced here and there, but the total for 1924 was probably not over 100 tons. The large molybdenum deposits of the United States, Canada and Norway require a large consumption of molybdenum steel for profitable operation, and so far, while the merits of molybdenum steel have been well established, there has not been sufficient consumption to warrant extensive production of ore. Of recent applications, outside of the automotive field, may be mentioned the use of molybdenum in rolls, i. e., low- and high-carbon steel rolls, and sand- and chill-cast iron rolls. The wear-resisting qualities of molybdenum steel and iron rolls are said to be good. Hidnert and Gero (cf. U. S. Bureau of Standards Scientific paper No. 488) have investigated the thermal expansion of molybdenum as affected by prior treatment. Coblentz (cf. U. S. Bureau of Standards Scientific paper No. 486) discusses some new thermoelectric, actinoelectric, and photoelectric properties of molybdenite.

Ferromolybdenum, 50 to 60 per cent grade, sold at $2.00 to $2.25 per lb. of contained Mo, during the year. Molybdenum concentrates, 85 per cent MoS_2, opened at $0.80 per lb. of contained MoS_2, duty paid New York, declined to $0.70 to $0.75 in October, and rose again to $0.80 at the close.

Ferrotitanium, Ferrouranium and Ferrozirconium

A new method, the details of which are not disclosed, has been developed by the Metal & Thermit Corporation for the preparation of pure titanium on a large scale. The principle of the process is said to be applicable to many of the refractory ores, but has so far been worked out completely only for titanium. Williams (*Engineering and Mining Journal-Press*, vol. 117, 1924, p. 645) has discussed the marketing and sources of titanium ores. The output of rutile and ilmenite by the American Rutile Co. in 1924 was around 250 tons of the former and 400 tons of the latter, from its Virginia properties.

Piwowarsky has studied the effect of titanium on the properties of cast iron, and particularly in connection with the malleabilizing process. He finds that titanium acts similarly to silicon in respect to graphite formation and in malleabilizing it accelerates decomposition of carbide and facilitates burning out of carbon. The advantages of titanium are more marked in black-heart iron. Comstock (THE IRON AGE, Dec. 4, 1924, p. 1477) discusses recent tests on the comparative deoxidizing effects of aluminum and titanium in the case of acid electric steel; the tests were favorable to titanium.

Ilmenite, 50 per cent TiO_2, sold at $15 to $20 per ton; and rutile, 94 per cent TiO_2, opened at $0.10 per lb. and rose to $0.12 to $0.15, in carload lots. Ferrocarbon-titanium, 15 to 18 per cent, sold at $200 per ton, f.o.b. Niagara Falls. Carbon-free ferrotitanium sold at around $0.30 to $0.40 per lb.

As indicated above, the Katanga deposits now dominate the world's uranium and radium markets, and but little carnotite is now being mined in the United States. The uses of uranium have not been extended much, and while efforts are still being made to use uranium in steel and cast iron, the amount consumed is small. Foote (*Foundry*, vol. 52, 1924, p. 105) discusses tests made on the effect of uranium on cast iron. It is found that uranium causes breaking up of the graphite flakes and gives a denser iron. Uranium-treated cast iron is being used for glass bottle molds and for blanks and plungers in bottle machines. Ura-

nium ore was not quoted in the American markets last year. Ferrouranium, 35 to 50 per cent U, sold at $4.50 per lb. of contained U all year.

As pointed out previously, considerable work has been done by the Electro Metallurgical Corporation on the effects of zirconium on steel, and the results of this work are described in recent papers by Field before the Amer. Inst. of Min. and Met. Engrs. and the treatment of steels with zirconium is covered in patents by Becket. Silicon-zirconium alloys were used to introduce the zirconium in these tests; these alloys had a range of composition of from 47 to 50 per cent silicon, 9 to 44 per cent zirconium, and 2 to 23 per cent iron. The results of these tests should further the use of zirconium in steel metallurgy. Zirkite is finding increased use for refractory purposes. Zircon was quoted at $50 per ton in 1924.

Minor and Complex Ferroalloys

There was little progress in the development and use of minor steel-making materials last year. Cobalt is being used more for magnet steels. Swann in a paper before the American Institute of Mining and Metallurgical Engineers discusses the production of ferrophosphorus in the electric furnace at the plant of the Federal Phosphorus Co. There has been a material increase in the use of ferrophosphorus in steel metallurgy in recent years, more especially for making additions of phosphorus to sheet steel. The electric-furnace ferrophosphorus is made in two grades, viz., 18 and 24 per cent phosphorus. The raw materials used in the manufacture consist of phosphate rock, coke, silica, and iron scrap. Merica (*Foundry Trade Journal*, vol. 30, 1924, p. 236) discusses the use of nickel in cast iron. An iron containing 1.5 to 2.0 per cent nickel is being used by the Cadillac Motor Co. for cylinders.

One of the most interesting developments in the field of special alloys is the introduction of Permalloy, containing 80:20 nickel-iron, valued for its remarkable magnetic qualities. Interesting developments in tantalum have been made by the Fansteel Co., North Chicago, Ill., and the marketing of tantalum ores and metal is discussed by Taylor (*Engineering and Mining Journal Press*, vol. 117, 1924, p. 842). Present world consumption of tantalum is about 5 to 6 tons per annum. Many patents for complex and special alloys were taken out in the past year, but lack of space prevents citing even a few of them here.

Cast Iron Pipe Sales Large in 1924

Good Prospects for 1925—Largest Orders Came from Detroit and New York—Imports Increasing

ALTHOUGH the total tonnage of cast iron water and gas pipe purchased through 1924 was heavy, estimated at 1,200,000 tons, individual municipal awards were, with a few exceptions, small and distributed over the entire consuming field. The single exception was the New England district where unusual quiet was maintained by municipalities, a condition attributed in large part to the general depression suffered by New England as a result of the dullness in the textile industry. Outstanding as large users of cast iron pipe were the cities of Detroit and New York, the former taking a total during the year of close to 60,000 tons and the latter buying about 30,000 tons. Privately owned utilities were also heavy purchasers, among those placing large single orders being the Detroit Gas Co., the Milwaukee Gas Co. in the West and the Brooklyn Union Gas Co. and several other large private corporations in the East.

Inquiries for spring delivery began to appear early in the year and by the end of January makers were in almost all cases working on a backlog of fully three months business. Before the end of that month most of the public utility companies in the New England district had covered their spring requirements and as municipalities did not appear as active buyers until a few came into the market late in the fall, New England maintained an almost unbroken quiet, except for awards of occasional small lots and the activity of private companies. In other sections of the country, both municipal and private buying were well maintained. July and August marked a slight decline in business, but improvement came in the fall. Prices, however, continued weak until well up to the end of the year, when the rising raw materials market began to have an effect.

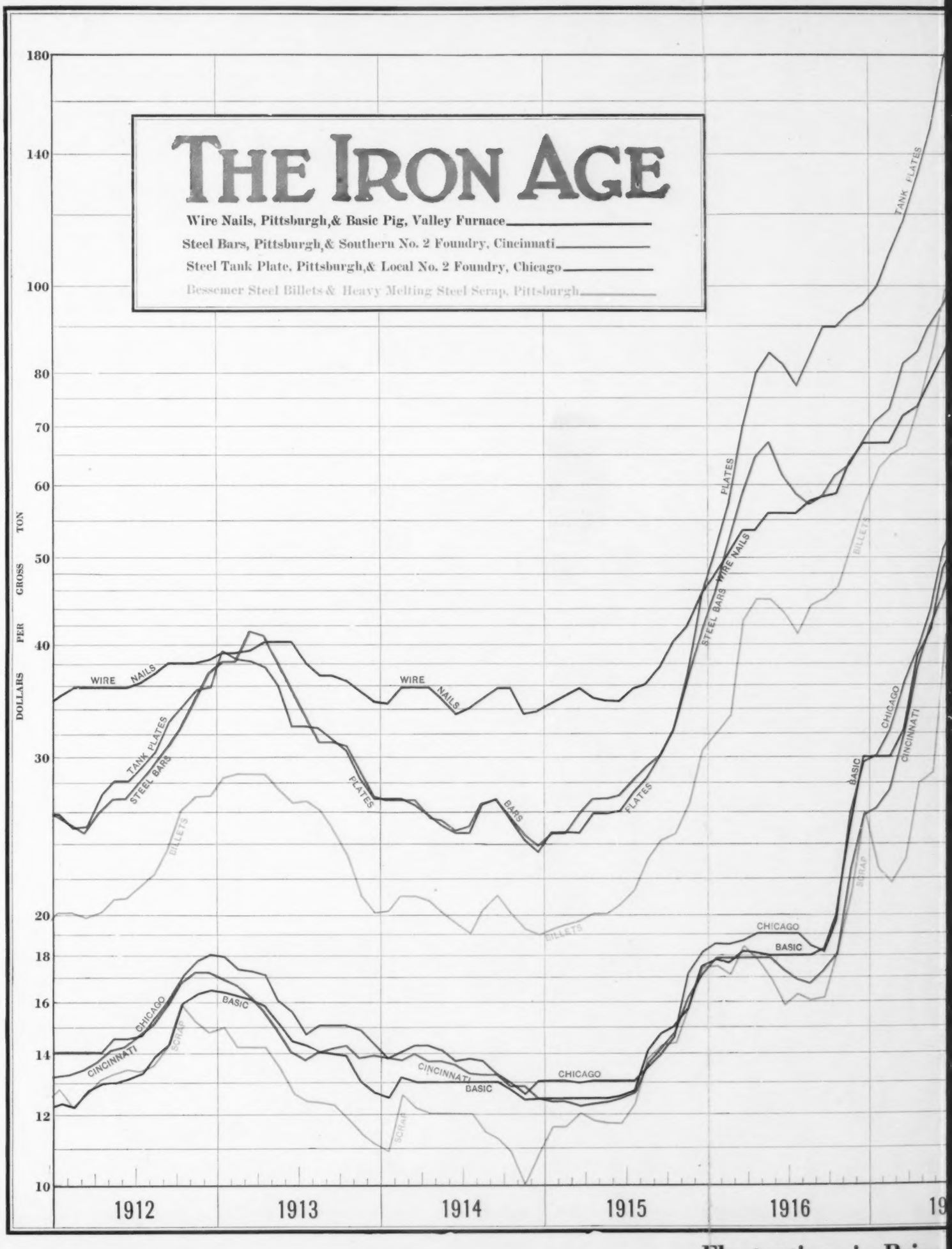
Activity of Continental makers of cast iron pipe was one of the features of the year's business. Imports reached a seriously large volume only on the Pacific Coast, where a fairly large total of purchases was made at prices several dollars a ton under the price of domestic makers. A few sizable lots were brought in to consumers on the Atlantic Coast, a private New Jersey company in the New York district taking a large tonnage from France and another large lot going to a Maine consumer. In the late spring and summer, few imports of Continental pipe were noted, but as the year came to a close, agents for European pipe makers were again active with highly competitive bids. In one instance, foreign bids were rejected by a municipality, but private users have manifested considerable interest.

Consumers have exhibited increased interest in centrifugally cast pipe and in many cases municipalities and private purchasers have asked for prices, specifying alternate quotations on the centrifugal product. Sand spun centrifugally cast pipe, under development for some time, was offered for sale commercially during the year.

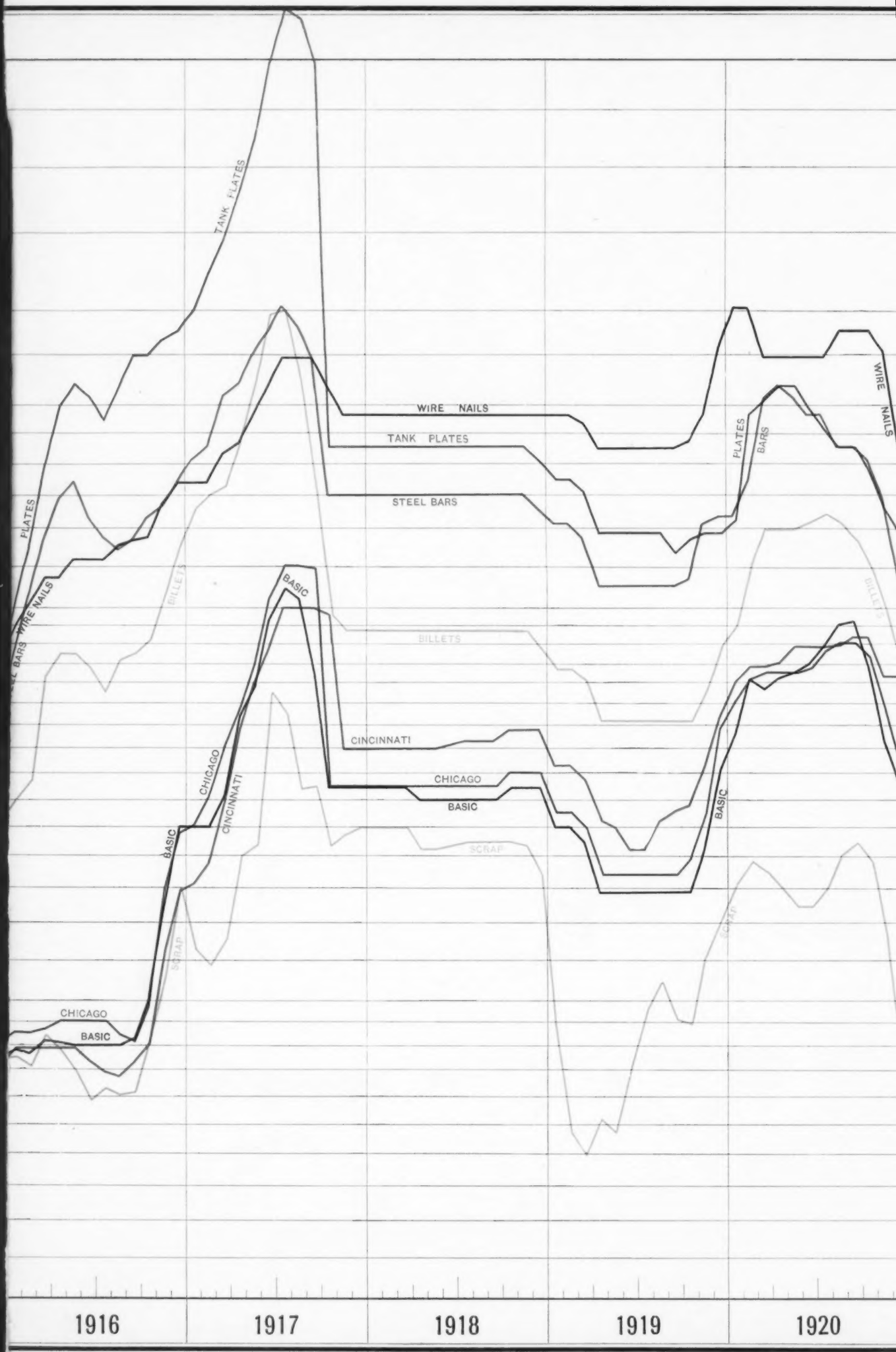
Pipe producers forecast an active year, beginning early in January. From plans under consideration it is expected that the City of New York will equal, if not surpass, its purchases of the past year. The City of Philadelphia is expected to adopt a plan for extension of water supply, which will involve heavy purchasing of pipe. After a year of quiet, New England municipalities are confidently expected to be active purchasers during the coming year. In the Middle West, a number of municipalities and private companies are reported preparing to come into the market after the first of the year.

The Ramapo Ajax Corporation, a subsidiary of the American Brake Shoe & Foundry Co., with headquarters in New York, has taken over the Elliot Frog & Switch Co. with works at East St. Louis, Ill., and Pueblo, Colo., effective Jan. 1, it was announced at St. Louis by W. H. Elliot, president of the Elliot company. The Ramapo Ajax Corporation has plants at Hilburn, Niagara Falls, New York, Chicago, and Superior, Wis. Mr. Elliot, who has been with the Elliot company 42 years, has been elected director and vice-president, with headquarters at East St. Louis; Dickson Fairback and W. J. Fairback, vice-presidents of the Elliot company, have been made vice-presidents of the Ramapo Ajax Corporation. The Elliot Frog & Switch Co. was founded in 1875 as Elliot & Co., and has 250 employees.

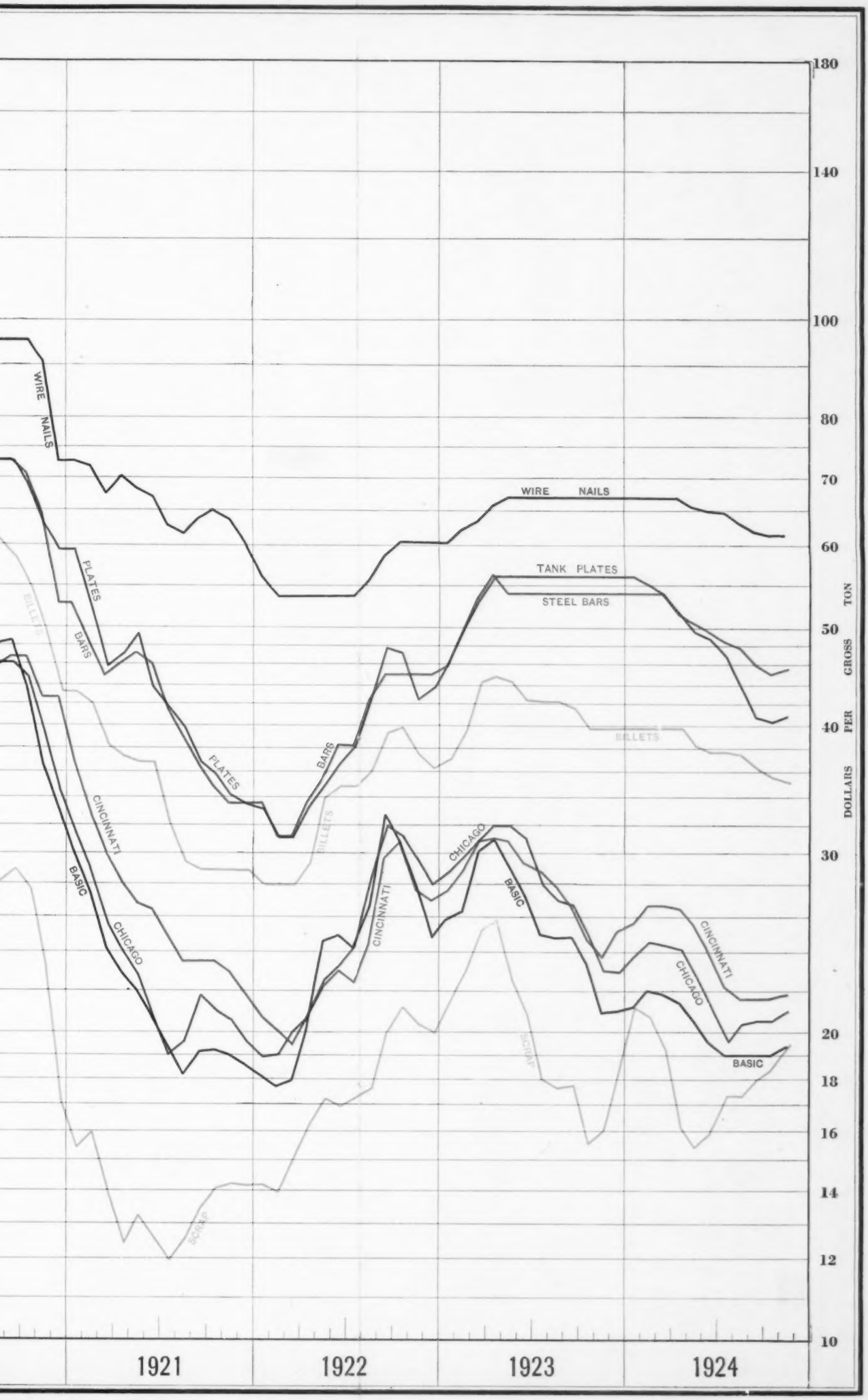
Steel barrels, 391,401 in number, were made during November and 389,230 were shipped, according to the Department of Commerce. Unfilled orders Nov. 30 were 1,230,808, much the highest of the year and double the average.



Fluctuations in Prices



Fluctuations in Prices of Pig Iron and Finished Steel—Thirteen Yea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DOLLARS PER GROSS TON
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Years

Iron and Steel Prices for Twenty-One Years

Monthly Averages Computed from the Weekly Market Quotations of THE IRON AGE in the Period of 1904 to 1924

IN this issue of THE IRON AGE are our two colored price charts, in which plotted lines indicate the course of prices for pig iron, billets, scrap and leading forms of finished iron and steel and non-ferrous metals in the 13 years ended with 1924. The diagrams are based on monthly averages of prices quoted week by week in our market reports from the leading selling centers. In the tables following are the monthly average prices of more than 50 products, including those on which the charts are based.

Bessemer Pig Iron at Pittsburgh, Dollars per Gross Ton (2240 lb.)

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$13.91	$16.85	$18.35	$23.15	$19.00	$17.34	$19.90	$15.90	$15.05	$18.15	$14.96	$14.59	$21.58	$35.95	$37.25	$33.60	$40.00	$33.96	$21.56	$29.27	$24.76
February	13.66	16.41	18.35	22.85	17.90	16.78	19.34	15.90	14.90	18.15	15.09	14.55	21.51	35.95	37.25	33.60	42.90	31.46	21.46	29.83	25.26
March	14.25	16.35	18.28	22.85	17.86	16.25	18.60	15.90	15.09	18.15	15.09	14.55	21.75	37.70	37.25	32.54	43.40	28.16	21.46	32.02	25.14
April	14.18	16.35	18.19	23.35	17.49	15.78	18.27	15.90	15.15	17.90	14.90	14.55	21.95	42.20	36.15	29.35	43.60	26.96	22.59	32.77	24.56
May	13.60	16.16	18.10	24.01	16.93	15.84	17.52	15.90	15.13	17.70	14.90	14.59	21.95	45.15	36.15	29.35	44.03	26.10	26.36	31.87	23.89
June	12.81	16.65	18.23	24.27	16.90	16.05	16.60	15.90	15.15	17.14	14.90	14.70	21.95	54.70	36.38	29.35	44.80	24.71	26.96	30.27	22.89
July	12.40	14.85	18.41	23.55	16.83	16.46	16.40	15.90	15.20	16.70	14.90	14.95	21.95	57.45	36.60	29.35	47.15	22.84	26.77	28.46	21.96
August	12.81	15.20	19.00	22.90	16.23	17.03	16.09	15.90	15.46	16.52	14.90	15.95	21.95	54.75	36.60	29.35	49.11	21.96	29.96	28.26	21.76
September	12.63	15.91	19.54	22.90	15.90	18.05	15.90	15.90	15.15	16.65	14.90	16.85	22.26	48.03	36.60	29.35	50.46	21.96	35.27	28.26	21.76
October	13.10	16.54	20.35	22.00	15.71	19.53	15.90	15.44	17.80	16.60	14.84	16.95	24.09	37.25	36.60	29.35	49.16	21.96	35.17	26.96	21.76
November	14.85	17.85	22.85	20.65	16.59	19.90	15.82	15.00	18.02	16.02	14.59	17.51	30.15	37.25	36.60	31.26	41.10	21.96	33.52	25.28	22.13
December	16.05	18.35	23.75	19.34	17.40	19.90	15.90	15.03	18.15	15.77	14.70	19.65	35.68	37.25	36.60	36.65	36.96	21.96	29.90	24.64	23.51
Average	*13.74*	*16.48*	*19.45*	*23.65*	*17.06*	*17.41*	*17.19*	*15.71*	*15.94*	*17.12*	*14.89*	*15.78*	*23.90*	*43.64*	*36.67*	*31.09*	*44.89*	*25.84*	*27.58*	*28.63*	*23.23*

Basic Pig Iron, f.o.b. Mahoning or Shenango Valley Furnace, Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January		$15.46	$17.06	$21.90	$16.90	$15.50	$16.87	$13.25	$12.35	$16.41	$12.50	$12.50	$17.81	$30.00	$33.00	$30.00	$37.40	$30.00	$18.15	$25.80	$21.25
February		15.25	16.82	22.00	15.97	15.12	16.31	13.65	12.25	16.30	13.19	12.50	17.69	30.00	33.00	30.00	42.25	27.50	17.75	26.25	22.00
March		15.55	16.85	21.50	15.62	14.94	16.00	13.75	12.81	16.11	13.00	12.50	18.20	32.25	33.00	28.94	41.50	24.20	17.94	30.13	21.94
April		15.06	16.88	21.50	15.25	14.05	15.94	13.75	13.00	15.87	13.00	12.50	18.13	38.75	32.00	25.75	42.40	22.88	20.00	31.05	21.55
May		15.06	17.00	22.90	14.91	14.12	15.19	13.32	13.00	15.15	13.00	12.50	18.00	41.60	32.00	25.75	43.25	22.00	24.60	29.00	20.50
June	$11.76	14.60	16.94	22.40	15.25	14.62	14.70	13.05	13.12	14.50	13.00	12.50	18.00	48.75	32.00	25.75	44.00	20.75	25.00	27.38	19.63
July	11.20	14.00	17.12	21.75	14.51	15.05	14.50	13.12	13.40	14.37	13.00	12.74	18.00	52.50	32.00	25.75	45.85	19.38	24.25	25.10	19.00
August	11.69	14.32	17.70	21.25	14.69	15.25	14.12	13.00	13.94	14.06	13.00	14.06	18.00	51.20	32.00	25.75	48.10	18.20	26.60	24.75	19.00
September	11.60	14.86	18.44	20.06	14.43	15.90	13.70	12.80	14.37	14.00	13.00	14.75	18.31	42.75	32.00	25.75	48.50	19.13	32.63	24.88	19.00
October	12.19	15.25	19.55	19.50	14.04	16.94	13.15	12.52	15.98	13.90	12.81	15.00	19.88	33.00	33.00	25.75	48.75	19.10	30.90	22.50	19.00
November	14.00	16.87	21.37	18.12	14.72	17.25	13.25	12.42	16.37	13.99	12.48	15.75	25.10	33.00	33.00	28.31	36.50	19.00	27.75	20.88	19.13
December	15.70	16.75	21.50	17.50	15.60	17.05	13.40	12.25	16.50	12.71	12.50	17.50	30.00	33.00	33.00	34.25	33.00	18.63	24.81	21.00	20.75
Average	*12.59*	*15.25*	*18.10*	*20.87*	*15.16*	*15.48*	*14.76*	*13.07*	*13.92*	*14.71*	*13.87*	*13.74*	*19.76*	*38.90*	*32.50*	*27.65*	*43.91*	*21.74*	*24.80*	*25.81*	*20.83*

Southern No. 2 Foundry Pig Iron at Cincinnati, Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$12.37	$16.25	$16.75	$26.00	$16.15	$16.25	$17.25	$14.25	$13.25	$16.95	$13.88	$12.40	$17.90	$26.10	$35.90	$34.60	$41.80	$36.75	$20.70	$27.45	$25.55
February	12.12	16.25	16.75	26.00	15.75	16.13	17.06	14.25	13.31	16.69	13.81	12.40	17.90	27.53	35.90	34.60	43.60	32.63	20.00	28.68	26.55
March	12.10	16.25	16.65	26.00	15.50	15.05	16.30	14.25	13.50	16.31	14.00	12.27	17.90	31.90	35.90	33.54	43.60	29.80	19.50	30.80	26.55
April	12.50	16.25	16.63	25.06	15.20	14.25	15.37	14.25	13.75	15.65	13.75	12.34	17.90	37.40	35.90	30.65	44.00	28.00	20.38	31.05	26.35
May	12.25	15.81	16.75	24.25	14.75	14.50	15.00	13.95	14.15	14.94	13.75	12.40	17.90	41.90	35.90	29.85	45.60	26.70	22.10	30.75	25.55
June	11.80	14.65	16.44	24.10	15.25	14.70	14.85	13.44	14.25	14.06	13.63	12.50	17.34	45.15	36.08	28.39	45.60	26.38	23.00	29.30	24.05
July	11.81	13.94	16.06	23.85	15.00	15.75	14.75	13.25	14.70	13.75	13.30	12.71	16.90	49.90	36.60	28.35	45.60	24.75	22.30	28.85	22.05
August	12.00	14.40	17.30	23.00	15.25	16.38	14.31	13.45	15.06	14.06	13.25	13.71	16.70	49.90	36.60	30.40	45.78	23.50	24.35	27.68	21.55
September	12.00	14.37	18.69	21.50	15.65	17.35	14.25	13.31	15.87	14.25	13.25	14.15	17.28	49.90	36.60	31.25	46.50	23.50	29.55	26.55	21.55
October	12.81	15.31	20.00	20.95	15.75	17.88	14.25	13.25	16.80	14.35	12.90	14.78	18.03	49.38	37.60	31.60	46.50	23.50	30.85	24.68	21.55
November	15.19	16.60	23.38	19.50	16.00	17.75	14.25	13.20	17.25	13.87	12.90	16.15	22.40	35.90	37.60	34.35	42.50	22.90	27.55	23.65	21.80
December	15.85	16.75	25.00	17.00	16.25	17.45	14.25	13.19	17.25	13.95	12.50	17.10	25.90	35.90	37.60	38.60	42.50	21.75	26.93	25.05	23.80
Average	*12.73*	*15.57*	*18.37*	*23.10*	*15.84*	*16.12*	*15.16*	*13.67*	*14.93*	*14.90*	*13.41*	*13.58*	*18.67*	*40.07*	*36.52*	*32.16*	*44.47*	*26.88*	*23.93*	*27.37*	*23.91*

Local No. 2 Foundry Pig Iron at Chicago (at Furnace), Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$14.47	$17.85	$19.60	$25.85	$18.45	$17.35	$19.00	$15.50	$14.00	$17.90	$13.75	$13.00	$18.50	$30.00	$33.00	$31.00	$40.00	$31.50	$18.90	$28.90	$23.70
February	13.91	17.85	19.41	25.85	18.16	16.75	19.00	15.50	14.00	17.31	14.00	13.00	18.50	32.00	33.00	31.00	42.25	29.00	19.00	29.75	24.50
March	14.05	17.80	19.35	26.10	17.85	16.50	18.30	15.50	14.00	17.25	14.25	12.95	18.70	36.00	33.00	29.94	43.00	25.60	20.00	31.25	24.38
April	14.35	17.60	19.10	26.35	17.73	16.50	17.50	15.00	14.00	17.00	14.25	13.00	19.00	39.25	33.00	26.75	43.00	24.00	20.50	32.00	24.10
May	13.85	17.60	18.90	26.85	17.63	16.50	17.06	15.00	14.50	16.00	14.06	13.00	19.00	43.80	33.00	26.75	43.00	22.80	22.60	32.00	22.75
June	13.70	17.00	18.54	26.60	17.73	16.50	16.75	15.00	14.50	15.62	13.69	13.00	19.00	51.00	33.00	26.75	43.40	20.75	23.25	31.25	21.25
July	13.60	16.47	18.60	25.55	17.55	17.00	16.56	14.87	14.70	14.70	13.75	13.00	19.00	55.00	33.00	26.75	45.25	19.00	24.25	27.90	19.60
August	13.60	16.60	19.45	24.85	17.35	17.13	16.50	14.50	15.37	15.00	13.69	13.44	18.40	55.00	33.00	26.75	46.00	19.55	28.60	27.00	20.38
September	13.85	16.60	20.16	24.10	17.05	18.70	16.40	14.50	16.60	15.00	13.25	13.90	18.13	54.67	33.00	26.75	46.00	21.75	32.00	26.75	20.50
October	14.10	17.66	21.48	22.45	16.85	19.00	16.00	14.46	17.00	15.00	12.94	14.63	19.63	33.00	34.00	27.75	44.50	21.00	31.40	25.00	20.50
November	15.98	19.15	24.70	20.66	17.10	19.00	16.00	14.09	17.75	14.87	12.56	17.13	25.80	33.00	34.00	31.00	39.40	20.60	29.75	23.13	21.00
December	16.95	19.60	25.85	18.80	17.35	19.00	16.00	14.00	18.00	14.30	13.00	18.10	29.50	33.00	34.00	38.75	34.50	19.63	28.00	23.00	22.40
Average	*14.37*	*17.65*	*20.43*	*24.50*	*17.57*	*17.49*	*17.09*	*14.83*	*15.32*	*15.83*	*13.60*	*14.01*	*20.26*	*41.31*	*33.35*	*29.16*	*43.53*	*22.93*	*24.85*	*28.16*	*22.09*

Standard Brands Eastern Pennsylvania No. 2X Foundry Pig Iron at Philadelphia, Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924.
January	$14.69	$17.50	$18.50	$24.80	$18.25	$17.25	$19.00	$15.50	$14.85	$18.25	$14.65	$14.25	$19.94	$30.10	$34.25	$36.15	$44.10	$33.34	$21.34	$29.76	$24.11
February	14.50	17.50	18.50	25.87	18.25	17.00	18.69	15.50	14.85	18.25	14.94	14.25	20.00	31.88	34.25	36.15	45.10	31.09	21.09	30.01	24.04
March	14.80	17.56	18.35	25.00	18.12	16.37	18.00	15.50	14.92	17.77	15.00	14.25	20.05	37.31	34.25	34.39	45.53	27.59	21.26	32.30	24.16
April	15.00	17.75	18.44	24.81	17.65	16.20	17.75	15.50	15.00	17.40	15.00	14.25	20.50	41.38	34.25	31.90	46.85	26.26	23.62	32.95	23.06
May	14.75	17.81	18.50	25.55	16.94	16.06	17.00	15.50	15.18	16.75	14.81	14.25	20.50	43.60	34.25	30.70	47.10	25.71	26.09	32.78	22.67
June	14.50	16.75	18.44	24.62	16.62	16.42	16.55	15.25	15.31	16.19	14.75	14.25	19.94	48.19	34.29	29.50	47.15	25.50	27.06	30.76	21.85
July	14.31	16.12	18.25	23.06	16.50	16.50	16.25	15.00	15.70	15.60	14.75	14.31	19.75	52.13	34.40	29.08	48.15	23.55	27.92	27.68	21.26
August	14.25	16.25	19.00	21.90	16.50	17.00	16.00	15.00	15.87	15.60	14.75	14.94	19.55	53.00	34.40	29.60	51.96	20.64	32.26	25.89	21.51
September	14.25	16.43	20.44	20.50	16.62	18.05	16.00	15.00	16.59	15.83	14.75	16.00	19.50	51.67	34.40	30.70	53.51	21.22	34.83	26.26	21.76
October	14.43	17.25	21.12	19.85	16.75	18.69	15.81	15.00	17.60	15.95	14.63	16.25	20.31	34.25	38.85	32.10	52.53	22.23	32.54	24.04	21.76
November	15.75	18.05	23.30	18.94	17.00	19.00	15.68	14.95	18.25	15.56	14.50	17.12	24.90	34.25	39.15	35.35	44.99	22.74	30.39	23.01	22.64
December	16.90	18.25	24.00	18.84	17.25	19.00	15.50	14.85	18.25	15.20	14.25	19.05	29.25	34.25	39.15	40.10	35.54	21.82	28.86	24.26	24.45
Average	*14.84*	*17.27*	*19.74*	*23.31*	*17.20*	*17.30*	*16.85*	*15.21*	*16.03*	*16.53*	*14.73*	*15.90*	*21.18*	*41.08*	*35.49*	*31.98*	*48.88*	*25.14*	*27.27*	*28.31*	*23.77*

Mahoning and Shenango Valley No. 2 Foundry Iron, at Furnace, Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$13.00	$16.12	$17.31	$24.60	$16.80	$15.44	$17.00	$13.75	$13.00	$17.50	$12.85	$13.00	$18.50	$31.00	$33.00	$31.00	$39.40	$31.88	$19.30	$27.00	$22.50
February	12.47	16.00	17.25	24.12	16.00	15.06	16.69	13.75	13.00	17.00	13.19	13.00	18.31	32.00	33.00	31.00	41.50	28.00	18.88	27.50	23.00
March	12.91	16.00	17.12	24.00	15.56	14.50	16.10	13.75	13.12	16.69	13.25	13.00	18.50	34.75	33.00	29.94	41.25	25.90	19.00	30.50	23.00
April	13.01	16.00	16.50	24.00	15.15	14.00	15.62	13.75	13.25	15.55	13.25	12.75	18.50	39.75	33.00	26.75	42.80	24.75	20.75	31.00	21.80
May	12.47	15.55	16.30	25.00	14.87	14.19	15.31	13.75	13.25	14.62	13.00	12.94	18.20	42.40	33.00	26.75	44.25	23.50	23.80	30.20	20.75
June	11.96	14.81	16.19	25.12	15.00	14.90	14.75	13.56	13.25	14.06	13.00	12.69	18.13	50.25	33.00	26.75	45.00	22.10	24.00	27.62	19.63
July	11.67	14.25	16.44	22.80	14.80	15.19	14.31	13.50	13.37	13.87	13.00	12.70	18.25	54.50	33.00	26.75	45.00	20.13	24.25	25.50	19.00
August	11.87	14.15	17.71	22.50	14.50	15.31	14.15	13.50	13.69	14.00	13.00	13.62	18.25	53.20	33.00	26.75	47.00	19.63	32.60	24.88	19.13
September	11.71	14.56	19.56	20.87	14.47	15.75	13.75	13.44	14.44	14.00	13.00	14.70	18.39	47.00	33.00	26.75	49.40	21.00	34.88	24.75	19.80
October	12.50	15.50	21.35	19.80	14.36	17.12	13.94	13.37	16.10	13.84	12.90	14.87	20.00	33.00	34.00	26.75	46.50	21.00	31.80	23.60	19.50
November	14.60	16.83	23.87	19.00	15.25	17.25	13.90	13.20	16.94	13.50	12.75	15.50	25.00	33.00	34.00	31.50	40.25	20.75	27.88	21.88	19.50
December	16.19	17.35	24.00	17.37	15.50	17.00	13.75	13.00	17.25	13.50	12.75	18.30	30.75	33.00	34.00	36.75	36.20	20.00	25.63	22.00	21.00
Average	*12.56*	*15.59*	*18.63*	*22.43*	*15.19*	*15.48*	*14.94*	*13.53*	*14.22*	*14.84*	*13.00*	*13.92*	*20.07*	*40.31*	*33.35*	*28.95*	*43.91*	*23.22*	*25.25*	*26.37*	*20.72*

Gray Forge Pig Iron, Philadelphia and Vicinity, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$13.50	$16.25	$16.75	$23.50	$16.50	$16.25	$17.25	$14.25	$14.25	$17.65	$14.00	$13.50	$18.41	$28.38	$32.00	$33.90	$40.23	$32.78	$20.60	$27.85	$22.81
February	13.50	15.75	17.00	23.50	16.50	16.25	17.50	14.25	14.25	17.31	14.00	13.44	19.00	29.75	32.00	33.90	40.50	30.90	20.50	28.37	22.50
March	12.75	16.25	16.75	23.50	16.50	15.50	16.90	14.60	14.25	16.87	14.00	13.25	19.00	31.94	32.00	32.84	43.00	26.86	20.50	29.62	22.12
April	13.75	16.25	16.75	23.00	16.00	15.00	16.62	14.75	14.37	16.56	14.00	13.25	19.13	38.50	32.00	29.65	43.00	25.26	21.25	30.37	22.00
May	13.75	16.00	16.50	23.25	16.00	15.00	16.00	14.70	14.50	15.81	13.81	13.25	19.50	40.40	32.00	29.21	43.00	25.26	23.80	29.50	22.00
June	13.50	15.75	16.25	23.00	15.25	15.25	15.65	14.50	14.62	15.37	13.75	13.25	19.25	44.31	32.00	26.25	43.00	24.69	24.25	28.00	22.00
July	13.25	14.50	16.10	22.50	15.25	15.50	15.37	14.50	14.87	14.95	13.75	13.25	18.50	50.05	32.00	25.92	43.00	22.50	25.50	26.90	21.20
August	12.50	15.00	16.50	22.50	15.25	16.25	15.00	14.30	15.37	14.62	13.75	14.50	18.50	49.56	32.00	26.60	45.46	21.20	29.00	25.50	21.00
September	13.00	15.00	17.75	19.50	15.50	17.00	14.75	14.45	15.87	14.56	13.75	15.13	18.50	44.25	32.00	27.00	47.10	20.00	31.00	25.50	21.00
October	12.75	15.75	18.25	18.75	15.50	17.50	14.50	14.25	16.87	15.00	13.62	15.25	19.35	32.20	36.60	28.69	47.10	20.50	31.00	24.20	21.00
November	14.00	16.25	20.00	17.00	15.75	18.00	14.37	14.25	17.62	14.75	13.50	16.05	23.75	32.00	36.60	32.40	44.64	22.50	29.14	23.00	21.37
December	15.50	16.50	22.00	16.75	16.00	18.00	14.25	14.25	17.75	14.58	13.50	17.63	27.69	32.00	36.90	36.10	38.74	21.69	28.14	23.00	23.00
Average	*13.48*	*15.77*	*17.55*	*21.83*	*15.83*	*16.29*	*15.67*	*14.42*	*15.38*	*15.67*	*13.79*	*14.31*	*20.05*	*37.73*	*33.18*	*30.21*	*43.83*	*24.51*	*25.39*	*26.82*	*21.85*

Malleable Pig Iron at Chicago, Dollars per Gross Ton

	1904	1905	1906	1907	*1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$14.50	$17.50	$19.37	$26.00	$18.60	$17.09	$19.00	$15.50	$14.35	$17.90	$13.88	$13.00	$19.00	$30.94	$33.50	$31.50	$40.50	$32.00	$18.90	$28.90	$23.88
February	14.50	17.50	19.19	26.00	18.25	16.75	19.00	15.50	14.14	17.31	13.94	13.00	19.00	31.75	33.50	31.50	42.75	29.38	19.13	29.75	24.50
March	14.00	17.50	19.00	26.25	17.50	16.50	18.40	15.50	14.00	17.25	14.25	13.00	19.40	35.40	33.50	30.44	43.50	25.80	20.00	31.25	24.38
April	14.00	17.50	18.77	26.50	17.50	16.50	17.50	15.25	14.00	17.05	14.25	13.00	19.50	39.00	33.50	27.25	43.50	24.00	20.50	32.00	24.10
May	14.00	17.37	18.35	26.60	17.56	16.66	17.06	15.00	14.40	16.00	14.06	13.00	19.50	43.60	33.50	27.25	43.50	23.00	22.60	32.00	22.75
June	13.85	16.65	18.00	26.25	17.37	16.50	16.75	15.00	14.50	15.62	13.88	13.00	19.50	50.25	33.50	27.25	43.50	21.50	23.25	31.25	21.25
July	13.75	16.37	18.37	25.62	17.50	16.90	16.56	15.00	14.50	14.65	14.00	13.00	19.50	55.00	33.50	27.25	45.25	19.00	24.25	27.90	19.60
August	13.75	16.50	18.95	24.80	17.50	17.12	16.50	14.80	15.10	15.00	14.00	13.44	19.00	55.00	33.50	27.25	46.50	19.60	28.60	27.00	20.38
September	13.50	16.56	20.12	24.40	17.26	18.50	16.40	14.50	16.25	15.00	13.25	14.30	19.00	54.75	33.50	27.25	46.50	21.75	32.00	26.75	20.50
October	13.75	17.37	21.32	22.40	17.00	18.50	16.06	14.50	17.10	15.20	13.00	15.25	19.88	33.50	34.50	28.25	45.75	21.00	31.40	25.00	20.50
November	15.87	19.00	24.16	20.25	17.00	19.00	16.00	14.35	17.87	14.87	12.88	17.13	25.80	33.50	34.50	31.50	39.90	20.60	29.75	23.13	20.88
December	16.50	19.50	26.00	18.75	17.00	19.00	16.00	14.35	18.00	14.63	12.90	18.20	29.50	33.50	34.50	39.50	35.00	19.63	28.00	23.00	22.40
Average	*14.33*	*17.44*	*20.13*	*24.49*	*17.50*	*17.42*	*17.10*	*14.94*	*15.35*	*15.87*	*13.69*	*14.11*	*20.78*	*41.35*	*33.75*	*29.68*	*43.01*	*23.11*	*24.87*	*28.16*	*22.09*

*From this time on the prices are given as at furnace near Chicago, and 35c. to 50c. per ton should be added to get the price delivered to Chicago foundries.

Lake Superior Charcoal Pig Iron at Chicago, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$16.62	$18.50	$20.40	$26.80	$22.50	$19.50	$19.50	$17.87	$16.00	$18.15	$15.25	$15.75	$19.50	$31.75	$37.50	$38.85	$48.75	$42.50	$31.10	$33.15	$29.15
February	15.87	18.50	20.13	27.00	21.38	19.50	19.50	17.50	15.95	18.00	15.25	15.75	19.75	33.75	37.50	38.85	58.38	39.50	29.38	33.90	29.15
March	15.00	18.50	19.75	26.75	21.25	19.50	19.30	17.50	15.75	18.00	15.25	15.75	19.75	36.75	37.50	38.85	58.20	38.50	26.00	35.40	29.15
April	15.19	18.50	19.44	26.50	20.30	19.50	19.00	17.50	15.75	18.00	15.45	15.75	19.75	40.25	37.50	31.75	57.25	38.50	26.50	36.53	29.15
May	15.00	17.75	19.05	27.40	20.00	19.50	18.62	17.25	15.75	18.00	15.75	15.75	19.75	48.15	37.50	31.75	57.50	37.50	28.40	36.65	29.15
June	14.70	17.00	19.00	27.50	20.00	19.50	18.50	16.80	16.75	16.81	15.75	15.75	19.75	52.88	37.62	31.75	57.50	37.50	29.75	36.65	29.12
July	14.50	16.50	19.06	27.00	20.00	19.50	18.50	16.50	16.25	15.65	15.75	15.75	19.75	57.75	38.00	31.75	57.50	36.37	31.65	34.81	29.04
August	14.87	16.40	19.35	27.20	19.50	19.50	18.50	16.50	16.25	14.69	15.75	16.00	19.75	58.00	38.00	32.25	57.70	33.60	34.05	32.04	29.04
September	14.75	16.87	20.13	27.00	19.50	19.50	18.40	16.50	17.12	15.25	15.75	15.85	19.75	58.00	38.00	32.75	58.50	33.00	36.15	32.04	29.04
October	15.31	18.25	21.50	26.20	19.50	19.50	18.12	16.50	18.65	15.25	15.75	15.75	20.25	37.50	38.00	33.44	58.50	31.50	36.15	29.86	29.04
November	16.37	19.20	24.63	25.12	19.50	19.50	18.00	16.50	18.65	15.25	15.75	17.00	26.46	37.50	38.70	38.50	55.75	31.50	36.15	28.40	29.04
December	17.80	20.00	26.13	24.25	19.50	19.50	18.00	16.37	18.75	15.25	15.75	18.65	31.75	37.50	38.70	43.00	49.13	31.50	34.65	29.15	29.04
Average	*15.50*	*18.00*	*20.71*	*26.56*	*20.24*	*19.50*	*18.66*	*16.94*	*16.80*	*16.53*	*15.60*	*16.13*	*21.33*	*44.15*	*37.88*	*35.29*	*56.22*	*35.96*	*31.66*	*33.22*	*29.09*

Southern No. 2 Foundry Pig Iron at Birmingham, Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$9.94	$13.94	$14.50	$23.10	$13.65	$13.00	$14.13	$11.00	$10.00	$13.56	$10.63	$ 9.50	$15.00	$23.20	$33.00	$31.00	$38.75	$32.25	$16.20	$23.25	$21.50
February	9.69	13.94	14.25	22.25	13.50	13.00	14.00	11.00	10.06	13.38	10.56	9.50	15.00	24.63	33.00	31.00	40.00	28.13	15.00	24.38	22.50
March	9.55	13.85	14.37	22.50	13.00	12.50	13.42	11.00	10.25	13.06	10.70	9.35	15.00	29.00	33.00	29.44	40.00	25.30	15.00	26.40	22.50
April	10.00	13.56	14.00	22.50	12.15	11.40	12.75	11.00	10.55	12.40	10.50	9.44	15.00	34.50	33.00	26.75	40.50	23.50	15.88	27.00	22.30
May	9.75	13.19	14.00	22.70	11.63	11.38	12.00	10.70	10.94	11.69	10.50	9.44	15.00	39.00	33.00	26.75	42.00	22.20	17.60	26.85	21.50
June	9.35	12.70	13.81	22.50	12.00	11.50	12.00	10.19	11.00	10.81	10.35	9.65	14.50	42.25	33.00	25.25	42.00	21.88	18.38	25.75	20.00
July	9.50	11.63	13.56	21.19	11.90	12.45	12.00	10.00	11.45	10.50	10.00	9.75	14.00	47.00	33.00	25.15	42.00	20.25	18.25	25.00	18.00
August	9.50	12.00	14.55	20.40	12.38	13.25	11.50	10.20	11.81	10.81	10.00	10.75	13.80	47.00	33.00	27.38	42.00	19.00	20.10	23.70	17.50
September	9.50	12.00	15.63	18.50	13.19	14.00	11.50	10.06	12.75	11.00	10.00	11.50	14.38	47.00	33.00	27.95	42.00	19.00	26.00	22.75	17.50
October	10.90	13.00	15.87	18.50	13.00	15.00	11.50	10.00	13.50	11.25	10.00	12.13	15.50	33.00	34.00	28.00	42.00	19.00	26.80	20.63	17.50
November	12.50	14.25	20.90	18.00	13.00	15.00	11.00	9.94	14.00	10.63	10.00	13.40	20.13	33.00	34.00	30.75	38.00	18.40	23.50	19.60	17.75
December	13.69	14.50	22.56	15.00	13.00	14.40	11.00	9.94	14.00	10.70	9.60	14.38	23.00	33.00	33.40	35.20	38.00	17.33	22.88	21.00	19.75
Average	*10.38*	*13.21*	*15.67*	*20.59*	*12.70*	*13.07*	*12.23*	*10.42*	*11.69*	*11.65*	*10.24*	*10.73*	*15.86*	*36.05*	*33.20*	*28.72*	*40.60*	*22.19*	*19.63*	*23.86*	*19.86*

THE IRON AGE Composite Iron and Steel Prices

Composite Pig Iron Price

Average of THE IRON AGE *quotations on foundry and basic pig irons; basic iron at Valley furnace; foundry iron an average of Chicago, Birmingham and Philadelphia. Quoted in dollars per gross ton.*

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$13.47	$15.95	$17.30	$23.24	$16.84	$15.68	$17.12	$13.63	$12.65	$16.49	$12.76	$12.38	$17.81	$28.88	$33.21	$31.36	$39.08	$31.18	$18.48	$26.78	$22.15
February	13.17	15.84	17.10	23.33	16.30	15.35	16.77	13.85	12.61	16.31	13.18	12.38	17.76	29.75	33.21	31.36	42.35	28.45	18.14	27.20	22.84
March	13.43	15.98	17.10	23.02	15.97	15.03	16.29	13.88	12.93	16.07	13.16	12.34	18.06	32.18	33.21	30.10	42.17	25.18	18.35	30.11	22.81
April	13.65	15.68	17.03	23.03	15.55	14.38	15.97	13.79	13.09	15.74	13.13	12.37	18.15	38.56	32.71	27.11	42.93	23.73	20.00	30.83	22.31
May	13.19	15.63	17.07	23.97	15.16	14.38	15.27	13.53	13.27	14.98	13.06	12.37	18.08	41.87	32.71	26.91	43.64	22.78	23.35	29.74	21.40
June	12.66	15.04	16.94	23.47	15.35	14.71	14.90	13.27	13.36	14.35	12.97	12.45	17.91	47.95	32.71	26.46	44.09	21.73	23.95	28.23	20.27
July	11.84	14.37	16.96	22.51	14.91	15.18	14.72	13.21	13.68	13.99	12.92	12.55	17.79	52.11	32.73	26.37	45.44	20.22	23.86	25.96	19.31
August	12.07	14.64	17.68	21.82	15.05	15.52	14.39	13.12	14.15	13.93	12.91	13.55	17.63	51.43	32.73	26.83	47.38	18.97	26.09	25.19	19.40
September	12.07	14.94	18.59	20.55	15.03	16.41	14.17	12.99	14.74	13.97	12.83	14.28	17.82	46.93	32.73	27.11	47.83	19.89	31.78	25.02	19.46
October	12.67	15.61	19.52	19.88	14.79	17.25	13.79	12.84	16.01	13.93	12.67	14.67	19.18	33.21	34.31	27.52	45.05	19.97	30.57	23.30	19.46
November	14.37	17.01	22.17	18.66	15.21	17.46	13.74	12.71	16.52	13.39	12.42	15.82	24.36	33.21	34.36	30.34	38.65	19.79	27.82	21.40	19.79
December	15.77	17.10	22.82	17.52	15.73	17.26	13.78	12.59	16.63	13.06	12.39	17.34	28.63	33.21	34.26	36.13	34.51	19.11	25.70	21.88	21.45
Average	*13.20*	*15.65*	*18.36*	*21.75*	*15.49*	*15.73*	*15.08*	*13.28*	*14.14*	*14.68*	*13.87*	*13.54*	*19.43*	*36.11*	*33.24*	*28.97*	*42.76*	*22.53*	*24.06*	*26.30*	*20.89*

Composite Price of Finished Steel

Average of THE IRON AGE *quotations on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. Quoted in cents per pound*

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	1.740	1.713	1.747	1.887	1.923	1.82	1.741	1.615	1.424	1.771	1.451	1.383	2.06	3.384	3.549	3.371	3.158	3.057	2.059	2.469	2.783
February	1.751	1.725	1.749	1.899	1.92	1.772	1.736	1.62	1.40	1.766	1.477	1.395	2.203	3.501	3.549	3.371	3.486	2.918	2.007	2.605	2.782
March	1.769	1.783	1.746	1.905	1.92	1.599	1.727	1.623	1.394	1.786	1.473	1.413	2.447	3.739	3.549	3.282	3.743	2.764	2.014	2.721	2.746
April	1.764	1.793	1.741	1.931	1.92	1.577	1.727	1.627	1.433	1.79	1.446	1.437	2.611	4.110	3.549	3.031	3.842	2.737	2.075	2.814	2.692
May	1.757	1.799	1.741	1.933	1.92	1.506	1.72	1.62	1.456	1.727	1.424	1.433	2.75	4.562	3.549	3.021	3.804	2.764	2.113	2.793	2.689
June	1.737	1.779	1.763	1.927	1.851	1.506	1.707	1.556	1.47	1.687	1.399	1.444	2.689	5.004	3.549	3.021	3.756	2.643	2.148	2.789	2.610
July	1.702	1.779	1.763	1.927	1.82	1.543	1.657	1.546	1.504	1.667	1.40	1.471	2.64	5.334	3.549	3.021	3.885	2.455	2.169	2.783	2.568
August	1.674	1.783	1.763	1.927	1.82	1.581	1.636	1.539	1.553	1.624	1.446	1.511	2.682	5.249	3.549	3.021	3.967	2.341	2.292	2.775	2.515
September	1.621	1.786	1.763	1.934	1.82	1.616	1.627	1.513	1.61	1.591	1.47	1.559	2.765	5.049	3.549	3.004	3.956	2.248	2.419	2.775	2.487
October	1.620	1.72	1.78	1.934	1.82	1.664	1.613	1.441	1.650	1.559	1.446	1.634	2.856	3.470	3.55	3.052	3.81	2.218	2.461	2.775	2.464
November	1.652	1.723	1.82	1.934	1.82	1.674	1.613	1.407	1.70	1.505	1.397	1.769	3.021	3.444	3.549	3.084	3.866	2.129	2.445	2.775	2.481
December	1.691	1.727	1.87	1.934	1.82	1.727	1.611	1.399	1.725	1.463	1.366	1.941	3.278	3.441	3.461	3.11	3.114	2.107	2.439	2.775	2.535
Average	*1.707*	*1.759*	*1.77*	*1.923*	*1.864*	*1.632*	*1.668*	*1.542*	*1.539*	*1.663*	*1.434*	*1.534*	*2.671*	*4.188*	*3.542*	*3.115*	*3.675*	*2.532*	*2.220*	*2.738*	*2.608*

Billets and Finished Steel

Bessemer Steel Billets at Pittsburgh, Dollars per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$23.00	$22.75	$26.25	$29.40	$28.00	$25.00	$27.50	$23.00	$20.00	$28.30	$20.13	$19.25	$32.00	$63.00	$47.50	$43.50	$48.00	$43.50	$28.00	$37.30	$40.00
February	23.00	23.50	26.50	29.50	28.00	25.00	27.50	23.00	20.00	28.50	21.00	19.50	33.50	65.00	47.50	43.50	55.25	42.25	28.00	39.63	40.00
March	23.00	24.00	26.70	29.00	28.00	23.00	27.50	23.00	19.75	28.50	21.00	19.70	42.40	66.25	47.50	42.25	60.00	38.40	28.00	44.38	40.00
April	23.00	24.00	27.00	30.12	28.00	23.00	26.75	23.00	20.00	28.50	20.80	20.00	45.00	73.75	47.50	38.50	60.00	37.50	29.50	45.00	40.00
May	23.00	23.50	26.40	30.30	28.00	23.00	26.12	22.60	20.80	27.37	20.00	20.00	45.00	86.00	47.50	38.50	60.00	37.00	34.00	44.60	38.50
June	23.00	22.00	26.63	29.62	25.75	23.00	25.30	21.00	20.37	26.50	19.50	20.50	43.50	98.75	47.50	38.50	61.00	37.00	35.00	42.63	38.00
July	23.00	22.00	27.25	30.00	25.00	23.50	25.00	21.00	21.50	26.60	19.00	21.38	41.00	100.00	47.50	38.50	63.50	32.25	35.00	42.50	38.00
August	23.00	24.00	27.80	29.25	25.00	24.13	24.62	21.00	22.12	26.00	20.25	23.13	44.20	86.00	47.50	38.50	61.00	29.60	36.10	42.50	37.75
September	20.00	25.00	28.00	29.37	25.00	25.00	24.40	20.75	23.62	24.87	21.00	24.10	45.00	66.25	47.50	38.50	58.74	29.00	39.50	41.88	36.40
October	19.50	25.63	28.00	28.20	25.00	26.25	23.75	20.00	26.00	23.30	20.00	24.63	46.25	49.38	47.50	38.50	55.00	29.00	40.00	40.00	35.75
November	20.25	26.00	28.88	28.00	25.00	27.13	23.30	19.50	27.00	21.00	19.25	26.50	52.00	47.50	47.50	41.38	49.70	29.00	37.75	40.00	35.50
December	21.20	26.00	29.50	28.00	25.00	27.50	23.00	19.25	27.00	20.00	19.00	30.60	57.50	47.50	45.50	46.00	43.50	29.00	36.50	40.00	35.75
Average	*22.08*	*24.03*	*27.41*	*29.22*	*26.31*	*24.61*	*25.40*	*21.43*	*22.39*	*25.79*	*20.08*	*22.44*	*43.95*	*70.73*	*47.33*	*40.51*	*56.22*	*34.46*	*33.96*	*41.70*	*37.97*

Wire Rod Prices at Pittsburgh for Twenty-one Years

No. 5 Bessemer wire rods, per gross ton. The quotations for November and December, 1917, and all of 1918, are Government prices and apply also to open-hearth rods.

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$30.00	$31.00	$33.75	$37.00	$34.30	$33.00	$33.00	$28.00	$24.37	$30.00	$25.50	$25.00	$43.00	$75.00	$57.00	$57.00	$60.00	$57.00	$36.00	$47.00	$51.00
February	30.00	31.00	34.00	37.00	35.00	33.00	33.00	28.75	25.00	30.00	26.38	25.00	48.00	77.50	57.00	57.00	63.75	54.50	35.75	49.38	51.00
March	30.80	31.70	34.00	37.00	35.00	33.00	33.00	29.00	25.00	30.00	26.50	25.00	54.80	81.00	57.00	55.75	70.00	52.00	36.00	50.00	51.00
April	31.00	34.00	34.12	37.00	35.00	29.00	32.50	29.00	25.00	30.00	26.00	25.00	60.00	85.00	57.00	52.00	70.00	49.00	38.00	50.25	51.00
May	30.50	34.00	34.40	37.00	35.00	27.50	32.00	29.00	25.00	30.00	25.50	25.00	60.00	86.00	57.00	52.00	72.50	48.00	38.00	51.00	48.75
June	29.20	33.30	34.00	37.12	33.50	27.50	30.80	28.25	25.00	29.50	24.50	25.00	53.75	92.50	57.00	52.00	75.00	48.00	38.50	51.00	48.00
July	28.00	31.87	34.00	36.50	33.00	29.40	29.25	27.00	25.00	28.30	24.50	25.63	53.75	96.25	57.00	52.00	75.00	43.00	40.00	51.00	48.00
August	28.00	32.10	34.00	36.10	33.25	31.00	28.25	27.00	25.80	28.00	25.00	27.00	55.00	94.00	57.00	52.00	75.00	41.80	42.40	51.00	46.50
September	27.00	31.12	34.00	36.00	33.00	31.50	28.00	27.00	27.00	27.37	26.20	29.40	55.00	88.75	57.00	52.00	75.00	39.50	46.25	51.00	46.00
October	26.00	31.75	34.50	35.40	33.00	31.87	28.50	26.00	28.50	26.60	25.88	31.75	55.00	77.25	57.00	52.00	75.00	40.50	45.00	51.00	45.50
November	26.75	32.10	35.50	34.00	33.00	32.50	28.12	25.30	29.75	25.87	25.25	36.25	63.00	57.00	57.00	54.50	66.40	40.00	45.00	51.00	45.00
December	29.80	32.50	37.00	34.00	33.00	33.00	28.00	24.50	30.00	25.17	25.00	39.50	68.75	57.00	57.00	59.50	57.00	38.00	45.00	51.00	48.00
Average	*28.92*	*32.20*	*34.44*	*36.18*	*33.84*	*31.02*	*30.37*	*27.40*	*26.29*	*28.40*	*25.52*	*28.89*	*55.84*	*79.77*	*57.00*	*53.98*	*69.55*	*45.94*	*40.49*	*50.39*	*48.31*

Steel Rails at Mill, Dollars per Gross Ton

Bessemer rails to end of 1913; open-hearth rails from beginning of 1914

The extra $2 per gross ton, which has for many years been charged for open-hearth rails, was annulled with the rail price announced Oct. 22, 1921

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00	$28.00	$30.00	$30.00	$30.00	$40.00	$57.00	$57.00	$47.00	$47.00	$40.00	$43.00	$43.00
February	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	30.00	40.00	57.00	57.00	47.00	47.00	40.00	43.00	43.00
March	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	30.00	40.00	57.00	54.50	49.50	47.00	40.00	43.00	43.00
April	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	30.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00
May	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00
June	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00
July	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00
August	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00
September	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	35.00	40.00	57.00	47.00	57.00	47.00	40.00	43.00	43.00
October	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	35.00	.....	57.00	47.00	57.00	45.25	43.00	43.00	43.00
November	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	38.00	.....	57.00	47.00	57.00	40.00	43.00	43.00	43.00
December	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	30.00	30.00	40.00	.....	57.00	47.00	53.00	40.00	43.00	43.00	43.00
Average	*28.00*	*28.00*	*28.00*	*28.00*	*28.00*	*28.00*	*28.00*	*28.00*	*28.00*	*28.00*	*30.00*	*30.00*	*34.00*	*40.00*	*57.00*	*49.29*	*54.33*	*45.69*	*40.75*	*43.00*	*43.00*

Soft Steel Bars at Pittsburgh, Cents per Pound

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	1.30	1.40	1.50	1.60	1.60	1.40	1.50	1.40	1.15	1.70	1.20	1.10	2.03	3.15	2.90	2.70	2.75	2.35	1.50	2.04	2.40
February	1.30	1.40	1.50	1.60	1.60	1.35	1.50	1.40	1.12	1.70	1.20	1.10	2.31	3.25	2.90	2.70	3.00	2.15	1.39	2.20	2.40
March	1.33	1.50	1.50	1.60	1.60	1.20	1.45	1.40	1.10	1.85	1.20	1.15	2.65	3.63	2.90	2.61	3.63	2.00	1.39	2.39	2.40
April	1.35	1.50	1.50	1.60	1.60	1.15	1.45	1.40	1.16	1.84	1.15	1.20	2.88	3.75	2.90	2.35	3.75	2.05	1.50	2.50	2.29
May	1.35	1.50	1.50	1.60	1.60	1.19	1.45	1.37	1.20	1.70	1.14	1.20	3.00	4.00	2.90	2.35	3.63	2.10	1.58	2.40	2.24
June	1.35	1.46	1.50	1.60	1.45	1.20	1.45	1.25	1.20	1.60	1.11	1.21	2.75	4.25	2.90	2.35	3.50	2.05	1.70	2.40	2.20
July	1.35	1.50	1.50	1.60	1.40	1.27	1.45	1.23	1.25	1.50	1.12	1.25	2.63	4.50	2.90	2.35	3.50	1.84	1.70	2.40	2.15
August	1.35	1.50	1.50	1.60	1.40	1.32	1.40	1.20	1.30	1.40	1.19	1.30	2.56	4.30	2.90	2.35	3.25	1.74	1.68	2.40	2.13
September	1.31	1.50	1.50	1.60	1.40	1.39	1.40	1.19	1.37	1.40	1.20	1.34	2.60	4.00	2.90	2.35	3.25	1.63	2.00	2.40	2.04
October	1.30	1.50	1.50	1.60	1.40	1.51	1.40	1.12	1.45	1.39	1.15	1.44	2.75	2.90	2.90	2.39	3.13	1.55	2.00	2.40	2.00
November	1.31	1.50	1.54	1.60	1.40	1.50	1.40	1.08	1.55	1.29	1.10	1.62	2.83	2.90	2.90	2.60	2.87	1.50	2.00	2.40	2.03
December	1.34	1.50	1.60	1.60	1.40	1.50	1.40	1.12	1.66	1.21	1.07	1.84	3.00	2.90	2.80	2.75	2.35	1.50	2.00	2.40	2.10
Average	*1.33*	*1.48*	*1.51*	*1.60*	*1.49*	*1.33*	*1.44*	*1.26*	*1.29*	*1.55*	*1.15*	*1.31*	*2.67*	*3.63*	*2.89*	*2.50*	*3.22*	*1.87*	*1.72*	*2.36*	*2.20*

Tank Plates at Pittsburgh, Cents per Pound

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	1.60	1.50	1.60	1.70	1.70	1.60	1.55	1.40	1.15	1.75	1.20	1.10	2.25	4.45	3.25	3.00	2.72	2.65	1.48	2.06	2.50
February	1.60	1.50	1.60	1.70	1.70	1.52	1.55	1.40	1.11	1.71	1.20	1.10	2.56	4.88	3.25	3.00	3.50	2.33	1.39	2.23	2.45
March	1.60	1.60	1.60	1.70	1.70	1.30	1.55	1.40	1.12	1.70	1.18	1.10	3.10	5.25	3.25	2.91	3.63	2.04	1.39	2.39	2.39
April	1.60	1.60	1.60	1.70	1.70	1.27	1.55	1.40	1.21	1.68	1.15	1.15	3.56	5.88	3.25	2.65	3.75	2.10	1.48	2.50	2.28
May	1.60	1.60	1.60	1.70	1.70	1.29	1.51	1.39	1.25	1.60	1.12	1.15	3.75	6.60	3.25	2.65	3.75	2.20	1.56	2.50	2.20
June	1.60	1.60	1.60	1.70	1.62	1.25	1.48	1.35	1.25	1.45	1.10	1.16	3.63	8.00	3.25	2.65	3.55	1.95	1.63	2.50	2.18
July	1.60	1.60	1.60	1.70	1.60	1.33	1.41	1.35	1.30	1.45	1.10	1.22	3.44	9.00	3.25	2.65	3.38	1.85	1.70	2.50	2.09
August	1.60	1.60	1.60	1.70	1.60	1.40	1.40	1.34	1.35	1.44	1.18	1.26	3.70	8.80	3.25	2.65	3.25	1.78	1.88	2.50	1.95
September	1.44	1.60	1.60	1.70	1.60	1.46	1.40	1.29	1.47	1.40	1.20	1.34	4.00	8.00	3.25	2.53	3.25	1.64	2.13	2.50	1.82
October	1.40	1.60	1.60	1.70	1.60	1.50	1.40	1.17	1.53	1.36	1.14	1.44	4.00	3.25	3.25	2.61	3.09	1.60	2.11	2.50	1.80
November	1.40	1.60	1.62	1.70	1.60	1.54	1.40	1.13	1.59	1.26	1.08	1.65	4.15	3.25	3.25	2.65	2.81	1.54	1.99	2.50	1.83
December	1.45	1.60	1.70	1.70	1.60	1.55	1.40	1.15	1.60	1.20	1.05	2.04	4.25	3.25	3.13	2.65	2.65	1.50	1.95	2.50	1.90
Average	*1.54*	*1.58*	*1.61*	*1.70*	*1.64*	*1.43*	*1.47*	*1.31*	*1.33*	*1.50*	*1.14*	*1.31*	*3.53*	*5.88*	*3.24*	*2.78*	*3.38*	*1.93*	*1.78*	*2.43*	*2.11*

Beams at Pittsburgh, Cents per Pound

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	1.60	1.50	1.70	1.70	1.70	1.60	1.55	1.40	1.15	1.75	1.20	1.10	1.90	3.25	3.00	2.80	2.47	2.45	1.50	2.06	2.50
February	1.60	1.50	1.70	1.70	1.70	1.52	1.51	1.40	1.11	1.71	1.20	1.10	2.06	3.25	3.00	2.80	2.70	2.26	1.39	2.20	2.50
March	1.60	1.60	1.70	1.70	1.70	1.30	1.50	1.40	1.15	1.70	1.19	1.10	2.40	3.54	3.00	2.71	3.13	2.08	1.39	2.39	2.39
April	1.60	1.60	1.70	1.70	1.70	1.27	1.50	1.40	1.21	1.68	1.15	1.20	2.55	3.88	3.00	2.45	3.25	2.10	1.50	2.50	2.29
May	1.60	1.60	1.70	1.70	1.70	1.27	1.50	1.39	1.25	1.50	1.14	1.20	2.60	4.00	3.00	2.45	3.10	2.20	1.56	2.50	2.24
June	1.60	1.60	1.70	1.70	1.62	1.25	1.48	1.35	1.25	1.45	1.11	1.20	2.53	4.31	3.00	2.45	3.10	2.10	1.63	2.50	2.20
July	1.60	1.60	1.70	1.70	1.60	1.33	1.41	1.35	1.30	1.45	1.12	1.25	2.50	4.50	3.00	2.45	3.10	1.98	1.70	2.50	2.09
August	1.60	1.63	1.70	1.70	1.60	1.40	1.40	1.35	1.35	1.45	1.19	1.30	2.52	4.30	3.00	2.45	3.10	1.82	1.88	2.50	2.00
September	1.44	1.70	1.70	1.70	1.60	1.46	1.40	1.34	1.42	1.41	1.20	1.35	2.64	4.00	3.00	2.45	3.10	1.64	2.00	2.50	2.00
October	1.40	1.70	1.70	1.70	1.60	1.50	1.40	1.21	1.48	1.37	1.15	1.44	2.75	3.00	3.00	2.45	3.05	1.60	2.00	2.50	1.93
November	1.40	1.70	1.70	1.70	1.60	1.54	1.40	1.13	1.57	1.29	1.10	1.60	2.86	3.00	3.00	2.45	2.89	1.54	2.00	2.50	2.00
December	1.44	1.70	1.70	1.70	1.60	1.55	1.40	1.15	1.60	1.25	1.07	1.78	3.26	3.00	2.90	2.45	2.48	1.50	2.00	2.50	2.10
Average	*1.54*	*1.68*	*1.70*	*1.70*	*1.64*	*1.42*	*1.45*	*1.32*	*1.32*	*1.50*	*1.15*	*1.50*	*2.55*	*3.67*	*2.99*	*2.53*	*2.96*	*1.94*	*1.71*	*2.42*	*2.15*

Monthly Averages of Ferroalloy Quotations

Ferromanganese (80 Per Cent) Prices in Dollars per Gross Ton, at Seaboard

	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$38.04	$41.00	$68.00	$44.40	$68.00	$150.00	$175.00	$250.00	$255.00	$146.00	$112.50	$58.35	$105.00	$108.70
February	37.69	41.00	65.00	39.25	69.75	207.50	231.25	250.00	215.00	172.50	100.00	60.42	107.50	107.50
March	37.10	41.00	65.00	38.50	100.00	349.60	290.00	250.00	175.00	216.25	96.00	62.50	113.75	107.50
April	36.75	43.00	61.00	38.00	100.00	406.25	362.50	290.00	150.00	240.00	90.00	64.37	120.00	107.50
May	36.50	47.50	61.00	38.00	100.00	387.50	420.50	290.00	138.40	250.00	85.00	66.87	128.00	107.50
June	36.50	49.25	61.00	38.00	100.00	270.00	443.75	290.00	121.00	225.00	80.00	67.50	128.75	107.50
July	36.50	48.88	59.00	37.20	109.00	175.00	406.25	290.00	111.00	225.00	70.60	67.50	*119.50	106.50
August	36.70	52.40	56.38	108.33	127.25	172.00	400.00	290.00	101.25	198.75	70.00	67.50	117.50	95.75
September	37.75	59.63	56.00	90.00	117.00	169.75	387.50	285.00	98.75	170.00	65.80	75.63	*111.25	90.00
October	38.50	67.80	50.10	70.40	105.00	162.25	310.00	285.00	105.00	170.00	63.00	100.00	*110.00	90.00
November	38.40	73.75	50.00	68.00	105.00	160.80	256.00	285.00	112.50	170.00	61.50	100.00	*108.75	98.75
December	39.75	75.00	47.00	72.20	106.00	169.75	243.75	275.00	122.50	135.00	60.00	100.00	*108.25	106.25
Average	*37.51*	*53.35*	*58.29*	*56.86*	*105.83*	*231.70*	*327.21*	*277.50*	*143.12*	*193.21*	*79.53*	*74.22*	*114.35*	*102.79*

*Price at furnace, where lower than price at seaboard.

Spiegeleisen (19 to 21 Per Cent), Dollars per Gross Ton at Furnace

	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$25.00	$25.00	$30.38	$60.00	$60.00	$66.00	$51.40	$45.00	$26.00	$34.40	$38.00
February	25.00	25.00	36.25	68.75	61.25	60.75	58.75	40.00	38.00	35.50	38.00
March	25.00	25.00	57.00	75.00	71.25	47.00	60.00	35.00	29.40	40.00	38.00
April	25.00	25.00	65.00	75.00	80.75	45.00	67.60	34.00	32.25	45.00	36.80
May	25.00	25.00	65.00	81.00	84.00	37.40	75.00	32.00	35.00	52.50	36.00
June	25.00	25.00	61.00	82.50	89.00	31.25	75.00	32.00	36.00	48.50	35.00
July	25.00	25.00	52.50	85.00	89.00	35.00	75.00	27.00	36.00	44.00	34.20
August	25.00	25.00	45.00	85.00	89.00	35.00	80.00	26.00	37.80	46.75	32.50
September	25.00	26.60	45.00	82.50	83.75	35.00	82.00	26.00	38.25	43.75	31.40
October	25.00	29.25	42.75	76.25	82.00	35.00	81.88	26.00	38.00	43.75	30.75
November	25.00	29.25	45.40	66.00	80.25	37.00	75.62	26.00	37.50	41.25	30.25
December	25.00	29.25	55.00	60.00	74.38	40.00	59.10	26.00	37.50	39.00	31.75
Average	*25.00*	*26.20*	*50.02*	*74.75*	*78.72*	*48.03*	*70.11*	*31.25*	*34.31*	*42.87*	*34.39*

Hot-Rolled and Cold-Rolled Strip Steel

Quoted in Cents per Pound, at Pittsburgh

	COLD-ROLLED STRIP STEEL								HOT-ROLLED STRIP STEEL							
	1917	1918	1919	1920	1921	1922	1923	1924	1917	1918	1919	1920	1921	1922	1923	1924
January	7.00	6.50	6.25	6.00	6.25	3.50	4.50	5.00	....	4.50	3.30	3.45	3.30	2.00	2.75	3.00
February	7.25	6.50	6.25	7.00	6.06	3.50	4.69	4.75	....	4.50	3.30	4.63	3.11	1.84	2.86	3.00
March	7.63	6.50	6.10	7.00	5.83	3.50	5.00	4.75	....	4.50	3.30	5.00	2.93	1.81	3.18	2.93
April	7.31	6.50	5.65	7.75	5.54	3.61	5.25	4.75	....	4.50	3.30	5.25	2.76	1.98	3.30	2.75
May	7.60	6.50	5.65	8.50	4.98	3.71	5.25	4.50	....	4.25	3.30	5.50	2.53	2.20	3.30	2.75
June	8.63	6.50	5.65	8.50	4.88	4.00	5.19	4.50	....	3.50	3.05	5.50	2.50	2.40	3.23	2.50
July	9.00	6.50	5.65	8.50	4.25	4.00	5.00	4.30	....	3.50	3.05	5.50	2.46	2.50	3.00	2.50
August	9.00	6.50	5.65	8.50	3.96	4.10	5.00	4.13	....	3.50	3.31	5.50	2.23	2.60	3.00	2.35
September	9.00	6.50	5.65	8.50	3.78	4.25	5.00	4.00	....	3.50	3.30	5.50	2.00	2.75	3.00	2.25
October	9.00	6.50	5.65	8.25	3.75	4.50	5.00	4.00	....	3.50	3.30	5.25	2.00	2.90	3.00	2.25
November	6.75	6.50	5.65	8.00	3.75	4.50	4.98	4.00	4.50	3.50	3.30	4.70	2.00	2.83	3.00	2.25
December	6.50	6.35	5.93	6.63	3.75	4.50	4.91	4.00	4.50	3.50	3.30	3.65	2.00	2.75	2.88	2.25
Average	*7.89*	*6.49*	*5.81*	*7.76*	*4.73*	*3.97*	*4.98*	*4.39*	....	*3.90*	*3.26*	*4.95*	*2.49*	*2.38*	*3.04*	*2.57*

Wire Nails at Pittsburgh, Dollars per Keg of 100 Lb.

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$1.89	$1.75	$1.85	$2.00	$2.05	$1.95	$1.85	$1.71	$1.57	$1.75	$1.54	$1.54	$2.13	$3.00	$3.50	$3.50	$4.50	$3.25	$2.50	$2.70	$3.00
February	1.90	1.80	1.85	2.00	2.05	1.95	1.85	1.75	1.60	1.75	1.60	1.57	2.25	3.00	3.50	3.50	4.50	3.21	2.40	2.78	3.00
March	1.91	1.80	1.85	2.00	2.05	1.95	1.85	1.79	1.60	1.76	1.60	1.60	2.40	3.20	3.50	3.44	4.00	3.02	2.40	2.83	3.00
April	1.90	1.80	1.85	2.00	2.05	1.87	1.85	1.80	1.60	1.80	1.60	1.56	2.40	3.28	3.50	3.25	4.00	3.13	2.40	2.93	3.00
May	1.90	1.80	1.85	2.00	2.05	1.65	1.82	1.80	1.60	1.80	1.56	1.55	2.50	3.50	3.50	3.25	4.00	3.05	2.40	3.00	2.93
June	1.90	1.74	1.85	2.00	1.97	1.70	1.80	1.75	1.60	1.80	1.50	1.55	2.50	3.75	3.50	3.25	4.00	3.00	2.40	3.00	2.90
July	1.89	1.70	1.84	2.00	1.95	1.72	1.75	1.70	1.62	1.70	1.52	1.60	2.50	4.00	3.50	3.25	4.00	2.81	2.40	3.00	2.88
August	1.71	1.70	1.82	2.00	1.95	1.80	1.70	1.69	1.66	1.65	1.56	1.61	2.58	4.00	3.50	3.25	4.25	2.75	2.48	3.00	2.81
September	1.60	1.74	1.86	2.05	1.95	1.80	1.70	1.65	1.70	1.65	1.60	1.69	2.60	4.00	3.50	3.25	4.25	2.86	2.63	3.00	2.78
October	1.60	1.80	1.85	2.05	1.95	1.80	1.70	1.64	1.70	1.63	1.60	1.80	2.63	....	3.50	3.31	4.25	2.90	2.70	3.00	2.75
November	1.62	1.80	1.88	2.05	1.95	1.80	1.70	1.55	1.70	1.59	1.50	1.87	2.85	3.50	3.50	3.50	4.05	2.84	2.70	3.00	2.75
December	1.73	1.80	2.00	2.05	1.95	1.85	1.70	1.53	1.72	1.55	1.51	2.04	3.00	3.50	3.50	4.12	3.25	2.69	2.70	3.00	2.85
Average	*1.79*	*1.77*	*1.86*	*2.02*	*1.99*	*1.82*	*1.77*	*1.70*	*1.64*	*1.70*	*1.56*	*1.67*	*2.63*	*3.62*	*3.50*	*3.41*	*4.09*	*2.96*	*2.51*	*2.94*	*2.89*

Average Monthly Prices of Pig Iron Delivered Philadelphia or Vicinity in 1924

Basic, Delivered Eastern Pa.		Standard Low Phos. F.o.b. Furnace		Virginia No. 2X Delivered Phila.	
Jan.	$23.00	Jan.	$27.10	Jan.	$30.18
Feb.	22.69	Feb.	27.00	Feb.	30.53
March	21.81	March	27.00	March	30.68
April	21.50	April	25.80	April	30.68
May	21.00	May	24.75	May	30.68
June	21.00	June	24.75	June	30.68
July	20.20	July	24.00	July	29.88
Aug.	20.00	Aug.	24.00	Aug.	28.68
Sept.	20.00	Sept.	24.00	Sept.	28.68
Oct.	20.00	Oct.	23.75	Oct.	28.68
Nov.	21.1?	Nov.	23.88	Nov.	28.68
Dec.	23.37	Dec.	25.25	Dec.	29.17

Cotton Tie Prices for Twenty-One Years
(Per Bundle of 45-Lb., f.o.b. Pittsburgh)

1904	$0.75	1911	$0.75	1918	$2.10
1905	0.85	1912	0.70	1919	1.70
1906	0.85	1913	0.80	1920	2.00
1907	0.95	1914	0.65	1921	1.30
1908	0.85	1915	0.85	1922	1.10
1909	0.70	1916	1.35	1923	1.60
1910	0.75	1917	2.10	1924	1.40

Foundry Pig Iron and Scrap Prices, Cincinnati

1924	Southern Foundry No. 2	Southern Ohio No. 2	No. 1 R.R. Wrought (Net Ton)	No. 1 Mach. Cast (Net Ton)
January	$25.55	$25.18	$13.85	$20.45
February	26.55	26.03	13.50	21.50
March	26.55	25.78	12.63	20.00
April	26.43	25.39	10.50	18.00
May	25.65	24.38	9.25	16.75
June	23.80	22.53	9.63	17.13
July	22.15	21.58	10.75	18.25
August	21.55	21.78	10.75	18.25
September	21.55	22.15	11.13	18.13
October	21.55	22.28	10.35	17.68
November	22.05	22.90	11.63	18.40
December	23.80	23.77	13.12	18.75

Average Monthly Pig Iron Prices F.o.b. Valley Furnace
(Per Gross Ton)

1924	Bessemer	Basic	No. 2 Foundry	Gray Forge	Malleable
January	$23.00	$21.25	$22.50	$22.00	$22.38
February	23.50	22.00	23.00	22.00	23.00
March	23.38	21.94	23.00	22.00	22.50
April	22.80	21.55	21.80	21.40	22.10
May	22.13	20.50	20.75	20.25	21.00
June	21.13	19.63	19.63	19.13	19.88
July	20.20	19.00	19.00	18.50	19.00
August	20.00	19.00	19.13	18.63	19.13
September	20.00	19.00	19.80	19.30	19.80
October	20.00	19.00	19.50	19.00	19.50
November	20.38	19.13	19.50	19.00	19.75
December	21.75	20.75	21.00	20.50	21.00

Wrought Iron and Steel Pipe Prices

Computed from discounts as per list, for carload lots; price for base size pipe, ¾ to 3-in.

Wrought Iron Pipe, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$49.28	$53.67	$49.28	$58.53	$67.20	$62.72	$53.76	$56.00	$56.00	$60.48	$62.72	$62.72	$72.98	$103.04	$150.08	$143.36	$140.94	$166.68	$124.32	$151.42	$156.80
February	49.28	54.88	49.28	67.20	67.20	57.92	53.76	56.00	56.00	60.48	62.72	62.72	77.40	105.44	150.08	143.36	146.72	166.68	124.32	156.80	156.80
March	52.95	56.00	49.28	67.20	67.20	49.28	53.76	56.00	56.00	60.48	62.72	62.72	82.09	111.42	150.08	140.58	146.72	157.92	124.32	156.80	156.80
April	53.76	56.41	49.28	67.20	67.20	49.28	53.76	56.00	56.00	60.48	62.72	62.72	86.61	125.01	150.08	135.52	146.72	152.54	124.32	156.80	156.80
May	53.76	57.12	49.28	67.20	67.20	49.28	53.76	56.00	56.00	60.48	62.72	64.96	89.60	138.88	150.08	135.52	146.72	144.48	124.32	156.80	156.80
June	51.52	57.12	49.28	70.34	64.06	49.28	53.76	56.00	56.00	62.65	62.72	64.96	89.60	138.88	150.08	135.52	146.72	144.48	124.32	156.80	156.80
July	51.12	57.12	49.28	71.68	62.72	49.28	53.76	56.00	56.00	62.72	62.72	64.96	89.60	149.72	150.08	135.52	146.72	137.01	124.32	156.80	156.80
August	51.12	57.12	49.28	71.68	62.72	53.33	53.76	56.00	56.00	62.72	62.72	64.96	89.60	150.08	150.08	135.52	146.72	135.52	128.80	156.80	156.80
September	51.12	57.12	49.28	71.68	62.72	53.76	53.76	56.00	58.17	62.72	62.72	64.96	91.39	150.08	150.08	135.52	146.72	124.32	141.68	156.80	156.80
October	51.12	49.54	52.17	70.38	62.72	53.76	56.00	56.00	58.24	62.72	62.72	64.96	91.84	150.08	150.08	135.52	146.72	124.32	147.84	156.80	156.80
November	51.12	49.28	53.76	67.20	62.72	53.76	56.00	56.00	60.48	62.72	62.72	67.20	93.03	150.08	150.08	135.52	146.72	124.32	147.84	156.80	156.80
December	51.12	49.28	55.06	67.20	62.72	53.76	56.00	56.00	60.48	62.72	62.72	67.20	98.42	150.08	150.08	135.52	157.78	124.32	147.84	156.80	156.80
Average	*51.44*	*54.56*	*50.38*	*68.46*	*64.70*	*52.95*	*54.32*	*56.00*	*57.11*	*61.68*	*62.72*	*64.59*	*87.68*	*136.90*	*150.08*	*137.25*	*147.16*	*141.88*	*132.08*	*156.35*	*156.80*

Steel Pipe, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$51.52	$51.70	$47.04	$56.53	$62.72	$58.24	$49.28	$44.80	$40.32	$44.80	$44.80	$42.56	$52.17	$80.64	109.76	$103.04	$ 95.20	$95.20	$64.96	$76.16	$85.12
February	53.76	53.76	47.04	58.24	62.72	54.24	49.28	44.80	40.32	44.80	45.88	44.16	55.00	83.04	109.76	103.04	95.20	95.20	64.96	80.64	85.12
March	56.00	54.88	47.04	60.84	62.72	47.04	49.28	44.80	40.32	44.80	45.92	44.80	59.69	89.02	109.76	100.51	95.20	95.20	64.96	80.64	85.12
April	56.00	55.29	47.04	62.72	62.72	47.04	49.28	44.80	40.32	45.51	45.51	44.80	64.21	100.43	109.76	95.20	95.20	88.48	64.96	81.76	85.12
May	56.00	56.00	47.04	62.72	67.72	47.04	49.28	44.80	40.32	46.10	44.80	47.04	67.20	100.80	109.76	95.20	95.20	84.00	64.96	85.12	85.12
June	53.76	56.00	47.04	62.72	59.58	47.04	49.28	44.80	42.56	47.04	44.80	47.04	67.20	100.80	109.76	95.20	95.20	84.00	64.96	85.12	85.12
July	48.16	56.00	47.04	62.72	58.24	47.04	49.28	44.80	43.14	47.04	44.80	47.04	67.20	100.80	109.76	95.20	95.20	80.39	64.96	85.12	85.12
August	48.16	56.00	47.04	62.72	58.24	47.04	49.28	44.80	44.80	45.31	44.80	47.04	67.20	100.80	109.76	95.20	95.20	79.52	67.65	85.12	85.12
September	47.11	56.00	47.04	62.72	58.24	47.04	49.28	44.80	46.37	44.80	44.80	47.04	68.99	100.80	109.76	95.20	95.20	75.04	71.68	85.12	85.12
October	47.98	47.33	49.93	62.72	58.24	49.28	44.80	42.63	47.04	44.80	44.80	47.04	69.44	100.80	109.76	95.20	95.20	70.56	73.47	85.12	85.12
November	51.52	47.04	51.52	62.72	58.24	49.28	44.80	42.56	47.04	44.80	42.63	49.28	70.63	108.27	109.76	95.20	95.20	70.56	76.16	85.12	85.12
December	51.52	47.04	54.41	62.72	58.24	49.28	44.80	40.32	47.04	44.80	42.56	49.28	76.45	109.76	105.64	95.20	95.20	67.76	76.16	85.12	85.12
Average	*51.79*	*53.09*	*48.33*	*61.68*	*60.22*	*49.13*	*48.16*	*44.06*	*43.80*	*45.38*	*44.68*	*46.43*	*65.45*	*98.00*	*109.42*	*96.95*	*95.80*	*82.16*	*68.32*	*83.35*	*85.12*

Cast Iron Pipe Prices, 1904 to 1924

At New York, 6-Inch, per Net Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$24.50	$28.00	$29.75	$34.25	$27.00	$24.50	$25.50	$22.00	$22.00	$25.00	$22.00	$20.00	$29.00	$41.50	$55.35	$65.70	$66.30	$63.30	$47.30	$54.90	$61.60
February	24.25	28.50	29.50	34.25	26.75	24.25	25.50	21.50	22.00	24.75	22.00	20.00	29.33	41.50	55.35	62.70	70.30	63.30	47.30	56.50	61.60
March	24.25	26.75	30.50	34.00	26.25	25.25	25.50	21.00	22.00	23.87	22.00	20.00	29.75	43.10	55.35	62.70	71.30	63.30	47.68	57.75	61.60
April	24.25	27.00	29.75	33.50	26.25	25.00	25.50	21.00	21.25	23.50	22.00	21.60	30.50	50.88	55.35	57.70	73.90	63.30	48.80	58.50	61.60
May	24.00	27.25	31.00	34.25	26.25	25.25	25.50	21.00	21.00	23.00	20.88	22.00	30.50	55.50	56.80	54.45	76.30	62.05	49.60	58.50	61.60
June	23.50	27.25	32.50	33.50	25.75	26.00	25.25	21.00	21.00	23.00	20.50	22.25	30.50	60.75	61.44	52.03	76.30	54.30	50.80	61.35	61.60
July	23.50	27.25	30.25	34.00	25.75	26.25	24.00	21.00	22.10	23.00	20.50	22.50	30.50	65.50	61.75	50.46	76.30	52.30	53.50	62.30	60.60
August	23.50	27.75	30.50	32.50	25.25	26.00	23.50	21.00	22.00	23.00	20.50	23.25	30.50	65.50	61.75	52.33	76.53	46.05	54.10	62.62	59.60
September	23.00	27.25	31.00	33.00	25.75	25.75	23.50	21.00	23.12	23.00	20.40	24.37	30.83	65.50	61.75	54.30	77.22	46.30	54.50	63.60	58.60
October	23.25	28.25	33.00	33.50	25.75	25.50	23.00	21.00	24.50	23.00	20.00	25.25	31.50	61.00	67.70	55.30	77.22	47.30	54.50	63.60	56.35
November	25.00	29.00	33.25	28.50	25.00	25.87	22.12	21.40	24.12	23.00	20.00	26.50	35.50	56.50	67.70	58.30	77.22	47.30	54.50	63.60*	55.60
December	27.00	29.25	35.50	28.00	25.50	25.70	22.00	22.00	24.62	22.33	20.00	27.60	41.00	56.50	67.70	61.30	68.87	47.30	54.75	63.60*	55.35
Average	*24.17*	*27.79*	*31.38*	*32.77*	*25.94*	*25.44*	*24.24*	*21.24*	*22.48*	*23.37*	*20.90*	*22.94*	*31.62*	*55.31*	*60.65*	*57.27*	*73.98*	*54.68*	*51.44*	*60.67*	*59.48*

*Concession of $2 to $3 per ton from this price to consumers willing to accept winter delivery.

Connellsville Coke Prices for Twenty-one Years

Average Prices of Prompt Connellsville Furnace Coke, per Net Ton at Oven

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$1.60	$2.46	$2.62	$3.53	$1.92	$1.59	$2.55	$1.40	$1.82	$3.88	$1.85	$1.50	$2.94	$9.50	$6.00	$5.65	$6.00	$5.06	$2.75	$8.05	$3.94
February	1.52	2.56	2.14	3.50	1.86	1.59	2.12	1.45	1.78	2.52	1.85	1.50	3.38	9.62	6.00	4.44	6.00	4.50	3.04	7.13	4.08
March	1.65	2.43	2.24	3.02	1.72	1.60	2.00	1.55	2.12	2.40	1.90	1.50	3.47	9.60	6.00	4.06	6.00	4.35	3.25	7.25	4.08
April	1.60	2.07	2.45	2.72	1.57	1.60	1.77	1.59	2.39	2.15	1.86	1.50	2.41	7.38	6.00	3.65	9.60	3.50	4.48	6.31	3.75
May	1.50	1.87	2.46	2.16	1.50	1.57	1.66	1.50	2.28	2.13	1.77	1.50	2.20	7.80	6.00	3.69	12.00	3.25	6.00	5.15	3.25
June	1.45	1.82	2.32	1.89	1.55	1.52	1.65	1.42	2.02	2.11	1.75	1.56	2.49	11.25	6.00	4.00	15.00	3.00	6.75	4.75	3.19
July	1.45	1.81	2.51	2.40	1.57	1.58	1.50	1.44	2.21	2.45	1.75	1.64	2.75	12.75	6.00	4.07	17.20	2.81	10.75	4.55	3.00
August	1.45	1.80	2.76	2.62	1.50	1.66	1.57	1.46	2.21	2.50	1.70	1.50	2.80	13.60	6.00	4.31	17.75	2.75	12.80	4.56	3.00
September	1.45	2.10	2.85	2.82	1.50	2.39	1.60	1.50	2.37	2.29	1.65	1.61	2.94	11.12	6.00	4.56	16.70	3.15	11.13	4.50	3.00
October	1.47	2.61	2.84	2.85	1.53	2.76	1.59	1.50	3.41	2.98	1.60	2.03	4.88	6.00	6.00	4.52	15.12	3.28	9.60	3.85	3.00
November	2.04	2.95	3.13	2.41	1.73	2.74	1.50	1.52	3.94	1.82	1.52	2.28	6.90	6.00	6.00	5.87	8.26	3.03	7.19	3.81	3.04
December	2.12	2.79	3.52	2.06	1.82	2.67	1.44	1.60	4.00	1.75	1.50	2.64	8.38	6.00	6.00	6.12	6.20	2.75	7.00	4.00	3.57
Average	*1.61*	*2.27*	*2.66*	*2.67*	*1.65*	*1.94*	*1.75*	*1.49*	*2.55*	*2.42*	*1.73*	*1.73*	*3.80*	*9.22*	*6.00*	*4.58*	*11.32*	*3.45*	*7.06*	*5.83*	*3.41*

Average Prices of Prompt Connellsville Foundry Coke, per Net Ton at Oven

January	$2.18	$2.38	$3.42	$4.25	$2.45	$2.00	$2.90	$1.90	$1.97	$4.40	$2.50	$2.00	$3.50	$9.75	$7.00	$6.25	$7.00	$6.38	$3.75	$8.70	$4.75
February	2.10	2.68	2.65	4.00	2.39	1.95	2.70	2.10	2.09	3.25	2.50	2.00	3.50	11.00	7.00	5.00	7.60	5.63	4.00	8.25	4.88
March	2.25	2.75	2.78	2.65	2.25	1.95	2.60	2.05	2.56	3.00	2.45	2.00	3.75	11.60	7.00	4.94	7.00	5.45	4.25	8.38	4.88
April	2.15	2.70	2.95	3.31	2.22	1.86	2.45	2.00	2.69	3.00	2.40	2.00	3.56	9.13	7.00	4.30	10.20	4.75	5.06	7.56	4.75
May	2.00	2.55	2.81	3.00	2.03	1.85	2.20	1.81	2.58	2.85	2.40	2.00	3.25	8.90	7.00	4.31	13.00	4.50	6.30	6.15	4.69
June	1.90	2.40	2.65	3.00	2.00	1.80	2.17	1.76	2.40	2.80	2.32	2.00	3.25	11.72	7.00	4.56	15.75	4.45	7.25	5.56	4.38
July	1.80	2.35	2.79	3.00	2.00	2.00	2.15	1.82	2.40	2.70	2.22	2.05	3.25	13.25	7.00	5.00	17.80	4.06	11.00	5.35	4.10
August	1.75	2.25	3.00	3.08	1.92	1.95	2.15	1.85	2.40	2.90	2.25	2.00	3.30	13.20	7.00	5.25	18.88	3.75	13.90	5.38	4.00
September	1.85	2.50	3.19	3.30	1.90	2.55	2.12	1.85	2.54	2.90	2.10	2.07	3.31	11.75	7.00	5.80	17.70	4.15	12.50	5.50	4.00
October	2.00	3.00	3.31	3.25	2.10	2.90	2.10	1.81	3.65	2.81	2.00	2.35	3.88	6.00	7.00	6.25	16.38	4.38	11.70	4.90	4.00
November	2.25	3.50	4.00	2.75	2.20	3.25	2.05	1.85	4.25	2.60	1.92	2.88	7.10	7.00	7.00	7.00	9.50	4.19	8.38	4.81	4.06
December	2.35	3.50	4.12	2.50	2.25	3.20	1.97	1.90	4.50	2.50	1.90	2.95	8.63	7.00	7.00	7.00	7.00	3.81	7.88	4.81	4.44
Average	*2.05*	*2.71*	*3.14*	*3.25*	*2.14*	*2.27*	*2.20*	*1.89*	*2.84*	*2.98*	*2.25*	*2.19*	*4.19*	*10.03*	*7.00*	*5.47*	*13.97*	*4.63*	*8.00*	*6.27*	*4.41*

Finished Iron and Steel at Chicago

(Cents Per Lb.)

1924	Common Bar Iron	Soft Steel Bars	Structural Steel
January	2.40	2.50	2.60
February	2.40	2.50	2.60
March	2.40	2.50	2.60
April	2.35	2.38	2.50
May	2.28	2.30	2.45
June	2.23	2.25	2.38
July	2.20	2.19	2.27
August	2.18	2.13	2.20
September	2.14	2.02	2.06
October	2.10	2.00	2.00
November	2.08	2.05	2.15
December	2.01	2.10	2.20

Yearly Averages	Common Bar Iron	Soft Steel Bars	Structural Steel
1924	2.23	2.24	2.33
1923	2.47	2.51	2.59
1922	1.95	1.83	1.86
1921	2.12	2.16	2.225
1920	3.72	3.34	3.22
1919	2.68	2.74	2.79
1918	3.50	3.08	3.18
1917	3.77	3.772	4.275
1916	2.31	2.94	2.83
1915	1.24	1.48	1.48
1914	1.06	1.32	1.34
1913	1.43	1.55	1.60

Yearly Averages	Common Bar Iron	Soft Steel Bars	Structural Steel
1912	1.32	1.42	1.46
1911	1.22	1.47	1.50
1910	1.45	1.63	1.66
1909	1.43	1.50	1.59
1908	1.56	1.66	1.82
1907	1.78	1.77	1.87
1906	1.71	1.68	1.86
1905	1.65	1.65	1.78
1904	1.41	1.50	1.71
1903	1.65	1.72	1.75
1902	1.71	1.73	1.75
1901	1.58	1.58	1.70

Scrap Prices at Chicago, 1905 to 1924

Heavy Melting Steel Scrap, per Gross Ton

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$14.88	$14.95	$16.80	$11.05	$13.94	$16.00	$11.75	$10.75	$12.60	$ 9.35	$9.19	$15.50	$21.12	$30.00	$17.40	$24.50	$15.13	$11.45	$19.15	$17.69
February	14.13	13.63	15.75	12.50	13.56	15.50	12.06	10.75	12.13	10.50	9.56	14.75	21.50	30.25	15.06	25.00	15.13	11.38	20.33	17.88
March	14.45	13.00	16.00	11.44	12.13	15.00	12.15	10.94	12.08	9.81	9.63	16.50	23.70	29.87	15.63	24.25	12.50	12.38	23.50	16.56
April	14.38	13.50	15.75	11.05	12.35	14.44	11.75	11.56	12.50	9.80	9.15	16.50	27.00	28.75	16.41	23.75	11.00	13.75	22.50	14.10
May	12.55	13.70	15.60	10.62	13.44	13.56	10.50	12.05	11.25	9.69	9.37	15.94	28.70	28.80	15.62	23.00	11.50	14.95	19.70	13.75
June	11.95	13.13	16.25	11.62	14.50	13.15	10.38	12.12	10.44	9.75	9.44	14.80	36.50	29.00	16.69	22.95	10.81	14.56	17.88	13.63
July	12.75	13.13	16.12	11.75	14.06	12.38	10.69	11.69	10.50	9.75	10.40	14.50	33.00	29.00	19.40	24.13	10.00	15.25	17.05	14.90
August	13.15	14.10	15.10	12.88	15.00	12.25	11.05	12.25	10.56	9.69	11.56	15.25	29.60	29.00	20.88	25.35	10.60	15.95	16.00	15.50
September	14.38	16.50	14.75	13.00	16.00	12.25	10.70	12.81	10.06	9.19	11.75	16.06	31.25	29.00	19.10	24.81	11.31	18.13	16.31	16.40
October	14.50	16.60	14.70	13.45	16.43	12.25	10.00	13.95	10.00	8.50	11.75	16.81	26.00	29.00	18.25	21.50	12.44	18.40	14.15	16.13
November	15.20	17.50	12.63	14.88	16.00	12.25	9.75	13.69	9.56	8.06	13.44	20.60	27.60	28.50	20.88	18.45	12.25	17.31	14.00	17.13
December	15.25	17.13	11.50	15.17	16.00	12.10	10.25	12.88	9.00	8.43	15.63	23.00	28.37	22.75	21.80	16.20	11.13	17.25	16.06	18.75
Average	*13.96*	*14.74*	*15.08*	*12.45*	*14.45*	*13.43*	*10.92*	*12.12*	*10.89*	*9.38*	*10.91*	*16.68*	*27.86*	*28.66*	*18.09*	*22.82*	*11.98*	*15.06*	*18.06*	*16.04*

Old Steel Rerolling Rails, per Gross Ton

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$16.00	$16.50	$19.00	$12.30	$15.81	$18.00	$13.69	$13.00	$16.15	$11.10	$9.62	$17.06	$27.00	$35.00	$22.10	$34.25	$15.63	$12.10	$20.40	$18.88
February	15.13	16.25	19.00	13.00	15.12	18.00	13.63	12.80	15.50	11.81	9.87	17.06	27.00	35.00	16.44	34.38	15.50	12.00	21.75	20.13
March	15.30	15.70	19.00	12.19	13.06	17.80	13.65	12.75	15.00	11.56	10.25	17.65	28.00	34.75	16.38	32.30	13.30	13.31	24.63	19.13
April	15.44	15.75	18.50	12.60	13.20	17.69	13.44	12.88	14.63	11.50	10.25	18.00	32.62	33.50	17.55	32.13	12.63	14.50	23.75	16.30
May	14.06	16.00	18.60	12.94	14.44	17.12	13.49	13.50	13.95	11.31	10.25	17.38	36.50	34.00	17.75	31.75	13.40	15.70	21.70	15.00
June	12.95	15.88	18.94	13.94	15.50	16.50	12.38	13.50	12.69	11.50	10.25	15.85	46.90	34.00	18.75	32.65	12.94	15.25	19.25	14.81
July	13.56	15.50	18.00	14.50	15.40	15.88	12.25	13.50	12.25	11.50	10.30	15.25	45.19	34.00	25.15	35.00	12.25	16.13	18.00	15.50
August	14.35	15.90	17.00	15.63	16.12	15.31	12.65	14.00	12.12	11.50	12.25	15.80	39.20	34.00	29.50	38.00	12.45	16.90	17.50	16.19
September	15.25	17.63	16.75	16.18	17.15	15.25	12.75	15.00	12.25	10.75	13.35	17.06	39.75	34.00	26.80	38.13	13.13	19.38	17.38	17.30
October	15.63	18.63	17.15	15.80	18.00	15.25	12.44	16.30	12.15	10.00	13.31	18.81	34.75	34.00	27.19	33.44	14.00	20.30	15.80	17.06
November	16.30	21.15	15.06	17.19	18.00	15.06	12.30	16.50	12.00	9.50	14.44	24.50	34.80	33.50	31.25	22.90	13.80	18.88	15.06	18.19
December	16.50	21.00	12.94	16.95	18.00	14.20	12.50	16.50	11.33	9.50	16.63	28.63	35.25	27.50	31.90	16.90	12.63	17.75	17.00	20.20
Average	*15.04*	*17.16*	*17.50*	*14.44*	*15.88*	*16.34*	*12.93*	*14.19*	*13.34*	*10.96*	*11.73*	*18.59*	*35.58*	*33.80*	*23.40*	*31.90*	*13.47*	*15.98*	*19.35*	*17.39*

No. 1 Railroad Wrought, per Net Ton

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$18.19	$17.30	$16.35	$11.20	$13.81	$14.88	$11.75	$11.63	$12.70	$8.70	$8.69	$15.88	$23.50	$31.25	$19.10	$26.00	$13.63	$10.50	$17.75	$15.31
February	17.00	15.88	15.50	12.44	12.88	14.69	12.00	11.30	12.19	9.50	8.87	14.94	23.75	31.25	15.13	27.00	13.50	10.44	18.38	15.38
March	16.40	14.88	15.25	11.25	11.43	14.45	12.30	11.44	12.13	9.06	9.00	16.20	25.90	30.75	15.88	27.10	11.60	11.50	20.88	14.06
April	16.06	14.50	15.25	11.00	11.90	14.19	11.69	12.31	12.38	9.00	8.65	17.00	30.35	30.20	16.05	27.25	10.00	12.13	20.00	12.75
May	14.19	14.50	15.45	10.75	12.81	12.87	11.38	12.75	11.25	9.00	8.94	16.50	32.60	29.75	15.69	26.38	10.40	12.90	17.60	12.00
June	13.50	13.50	16.06	11.69	13.38	12.75	11.25	12.57	10.56	9.00	9.00	15.20	41.00	29.75	16.87	25.25	9.63	12.69	15.50	11.56
July	14.13	13.50	15.06	12.15	13.16	12.44	11.00	12.06	10.55	9.00	9.15	14.94	37.75	29.75	18.60	24.88	9.25	13.63	14.60	12.80
August	15.45	14.50	14.40	12.69	14.44	11.94	11.10	12.50	10.62	8.94	10.44	15.30	33.70	29.75	20.75	24.75	10.45	14.75	14.25	13.75
September	16.31	16.13	14.38	13.44	15.35	11.94	10.94	13.13	10.19	8.37	11.00	16.38	35.50	29.75	19.50	23.88	11.50	17.62	15.63	14.80
October	17.00	17.50	14.60	13.60	15.94	11.75	10.44	14.25	9.60	7.87	11.19	17.50	28.75	30.36	19.38	20.25	13.00	17.75	13.20	14.25
November	17.50	18.00	12.32	14.38	15.31	11.94	10.20	13.50	9.00	7.56	12.94	21.00	30.90	28.68	22.88	16.85	12.20	15.81	12.50	15.50
December	18.00	17.25	11.00	14.83	14.75	11.65	10.75	13.06	8.50	7.90	15.38	25 13	31.25	24.62	24.10	14.60	10.44	15.13	15.00	16.70
Average	*16.14*	*15.62*	*14.64*	*12.45*	*13.76*	*12.96*	*11.23*	*12.54*	*10.81*	*8.66*	*10.27*	*17.16*	*31.25*	*29.68*	*18.66*	*23.68*	*11.30*	*13.74*	*16.27*	*14.07*

No. 1 Cast Scrap, per Net Ton

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$13.81	$14.70	$17.80	$12.95	$13.06	$14.88	$12.19	$11.25	$12.90	$10.20	$9.19	$13.31	$15.50	$25.90	$22.95	$37.25	$17.25	$12.90	$21.60	$20.38
February	13.13	13.50	18.25	13.00	12.75	14.88	12.13	11.25	12.69	10.87	9.00	12.81	15.37	26.06	20.00	38.88	18.00	13.25	23.63	21.00
March	13.40	12.75	19.50	12.12	12.19	14.50	12.25	11.31	12.50	10.37	9.00	13.45	16.90	27.25	21.63	37.85	14.90	14.13	26.25	20.13
April	13.81	12.94	18.88	12.05	12.60	13.69	11.81	12.06	12.44	10.25	9.00	12.88	20.43	27.12	21.45	37.25	13.25	14.88	25.75	18.40
May	12.50	13.40	18.55	11.50	13.31	13.13	11.00	12.20	11.60	10.06	9.00	12.56	23.20	26.70	20.12	37.38	13.60	16.20	23.30	17.38
June	12.40	13.50	18.94	12.00	13.81	13.00	10.75	11.81	10.63	9.75	9.00	11.75	30.00	27.12	20.75	36.30	12.75	16.06	21.75	16.75
July	13.38	13.50	18.44	12.15	13.44	13.00	10.50	11.75	10.70	9.65	9.25	11.50	29.25	28.06	23.30	36.50	12.25	17.00	19.60	16.90
August	13.20	14.00	16.75	12.75	14.06	12.75	10.55	12.15	10.87	9.50	9.62	11.50	24.20	29.10	24.50	36.20	12.60	18.60	18.00	17.50
September	13.38	15.38	16.81	12.88	14.75	12.75	10.10	12.81	10.62	9.19	10.10	12.13	23.75	30.00	24.20	34.00	13.44	21.38	19.63	18.20
October	13.63	15.90	16.25	13.25	15.63	12.50	10.25	14.20	10.40	9.00	10.50	13.50	20.50	30.36	25.00	28.75	13.88	20.80	18.70	17.50
November	14.30	17.50	14.00	13.75	15.12	12.50	10.35	13.50	10.06	8.56	12.13	15.55	22.00	28.87	28.12	23.00	13.50	20.25	18.38	17.88
December	15.00	17.50	13.00	13.92	14.75	12.30	11.00	13.25	9.83	9.00	13.75	16.25	23.50	25.75	32.35	18.70	12.63	19.75	19.75	19.00
Average	*13.50*	*14.55*	*17.96*	*12.69*	*13.79*	*13.32*	*11.07*	*12.30*	*11.27*	*9.70*	*9.96*	*13.10*	*23.05*	*27.69*	*23.70*	*33.51*	*14.00*	*17.10*	*21.36*	*18.43*

Railroad Malleable Scrap, per Gross Ton

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$15.75	$16.80	$19.26	$11.65	$14.43	$16.80	$12.25	$12.19	$15.01	$10.36	$9.11	$15.47	$19.88	$30.02	$19.71	$32.48	$16.52	$12.77	$25.26	$20.93
February	15.33	15.96	17.92	12.67	13.87	16.45	11.76	11.54	14.56	11.63	8.96	14.93	19.39	30.02	16.65	33.53	17.36	12.81	26.75	21.77
March	15.05	14.56	18.20	11.20	12.88	16.24	12.32	11.69	14.56	10.71	8.89	15.62	20.10	31.24	18.07	31.92	15.46	13.87	28.56	21.00
April	14.84	14.99	18.35	11.31	12.60	15.33	12.32	12.53	14.77	10.25	8.96	15.56	22.81	31.64	17.70	30.95	13.59	15.68	28.00	19.30
May	13.87	15.12	18.20	10.99	13.87	14.49	11.63	12.94	13.55	10.24	9.12	15.05	26.10	32.82	17.08	29.68	14.11	16.80	25.54	18.13
June	13.33	15.12	19.60	11.48	14.49	13.66	11.31	13.16	12.39	10.08	9.11	13.14	35.41	33.04	17.92	28.73	12.88	16.73	24.08	16.88
July	13.79	14.99	18.76	12.77	14.28	12.60	11.20	13.16	11.87	10.08	9.97	13.03	33.73	33.28	20.94	30.24	12.53	17.51	22.51	17.00
August	14.73	15.23	17.92	13.51	15.33	12.32	11.26	13.50	11.63	9.95	11.20	12.60	33.26	34.01	22.96	32.20	13.44	19.04	20.59	17.38
September	15.89	16.80	17.92	13.87	16.97	12.54	11.20	14.07	11.41	9.24	11.48	12.88	34.44	34.01	21.22	30.95	14.63	23.67	21.71	18.20
October	15.96	16.95	18.14	13.94	17.08	12.32	10.85	15.40	10.81	8.85	11.48	13.87	28.28	34.01	21.35	26.32	15.12	24.42	19.60	18.13
November	16.30	19.38	13.72	15.05	16.95	12.60	10.64	15.19	10.43	8.68	12.75	17.92	28.67	32.68	25.89	21.78	14.67	23.11	18.91	19.00
December	16.80	20.16	11.76	15.31	16.74	12.60	11.27	15.12	10.08	8.90	15.40	20.16	30.63	25.48	28.78	16.80	12.81	22.40	20.23	20.10
Average	*15.13*	*16.34*	*17.48*	*12.81*	*14.95*	*14.00*	*11.50*	*13.37*	*12.59*	*9.91*	*10.53*	*15.02*	*27.72*	*31.85*	*20.85*	*28.80*	*14.43*	*18.23*	*23.48*	*18.99*

Cast Borings, per Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Jan.	$5.19	$8.68	$10.08	$18.48	$12.54	$16.11	$10.92	$6.38	$15.57	$13.58
Feb.	5.32	8.27	10.15	18.48	8.75	16.39	11.76	6.93	16.59	15.55
March	5.32	8.29	10.64	18.48	10.15	15.74	8.40	8.05	18.91	14.38
April	5.38	7.84	11.83	17.99	10.47	15.96	7.28	9.24	17.92	11.40
May	5.60	7.56	13.44	17.53	9.31	14.43	6.61	10.96	16.24	10.00
June	5.60	6.44	19.60	17.77	9.33	13.38	5.60	11.63	14.43	10.06
July	5.77	6.37	20.01	18.48	12.71	14.15	5.32	12.67	13.66	10.45
Aug.	6.44	6.78	18.36	18.48	14.28	15.06	5.38	12.88	12.04	10.69
Sept.	7.16	7.28	18.20	18.48	13.55	14.65	5.60	14.45	12.19	11.80
Oct.	7.28	7.63	15.75	18.48	11.63	12.88	6.44	14.90	10.42	11.56
Nov.	7.35	8.40	17.25	16.80	12.88	11.93	6.83	14.56	10.08	12.63
Dec.	8.45	10.29	18.05	14.84	14.17	10.98	6.09	14.56	12.04	14.20
Aver.	*6.24*	*7.82*	*15.98*	*17.94*	*11.65*	*14.30*	*7.19*	*11.48*	*14.17*	*12.19*

Steel Knuckles and Couplers, per Gross Ton

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Jan.	$9.45	$16.59	$25.20	$37.52	$24.51	$27.44	$16.39	$12.77	$24.98	$21.21
Feb.	9.57	16.31	25.20	36.89	19.32	29.68	16.11	12.39	26.53	21.77
March	9.69	17.19	26.60	35.00	19.60	27.66	13.55	14.12	28.71	20.00
April	9.03	17.36	30.67	34.00	19.21	26.32	12.47	15.68	27.93	17.40
May	9.11	17.19	33.71	34.00	17.36	25.48	13.66	16.69	25.42	17.00
June	9.58	16.39	43.83	34.00	18.20	25.20	13.16	15.89	22.55	16.63
July	10.71	15.12	45.92	34.00	20.50	27.16	11.63	17.92	21.00	17.20
Aug.	11.83	15.57	44.24	34.00	23.52	29.01	12.21	19.21	20.87	18.00
Sept.	12.32	16.52	40.88	34.00	21.95	27.72	13.03	21.84	21.56	19.35
Oct.	12.60	17.36	33.38	34.00	21.43	24.51	14.84	22.96	18.93	18.25
Nov.	14.50	25.20	33.04	34.00	23.39	20.83	14.28	21.84	17.64	19.63
Dec.	16.67	26.04	35.67	32.55	24.86	16.95	12.60	22.12	19.88	22.60
Aver.	*11.25*	*18.07*	*34.86*	*34.50*	*21.15*	*25.67*	*13.66*	*17.79*	*23.00*	*19.09*

Old Cast Iron Carwheels, per Gross Ton

	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$16.56	$19.00	$24.90	$20.10	$15.75	$18.38	$13.00	$13.25	$16.95	$11.65	$9.94	$14.63	$18.87	$30.00	$25.90	$36.13	$21.00	$15.30	$26.70	$20.50
February	16.38	19.00	23.50	16.94	15.25	17.88	13.00	13.05	16.75	12.44	10.00	13.94	18.25	30.00	22.75	38.06	20.63	15.00	27.25	21.00
March	16.75	18.60	23.88	15.50	14.69	17.00	13.25	13.00	16.75	11.88	9.94	14.30	20.25	30.00	21.50	36.20	15.90	16.50	28.38	21.00
April	15.88	18.75	25.00	14.00	14.50	16.50	13.25	13.25	16.75	11.55	9.75	13.88	23.62	29.00	21.50	37.50	14.05	18.63	27.75	16.70
May	14.81	19.00	25.20	12.88	14.81	15.75	12.75	13.90	15.05	11.50	9.75	12.95	27.35	29.00	21.25	37.50	14.70	18.50	24.10	16.25
June	14.25	18.00	25.38	13.00	15.81	15.50	12.55	14.13	13.94	11.50	10.19	12.44	39.00	29.00	22.00	35.90	13.31	18.25	21.88	15.63
July	14.38	18.00	24.25	13.30	16.00	14.81	12.50	13.88	12.90	11.25	11.30	12.50	35.25	29.00	23.95	35.75	12.75	19.25	20.60	16.40
August	14.95	18.50	24.50	15.50	16.25	14.50	12.85	13.70	12.75	11.25	11.04	11.60	30.40	29.00	26.25	38.35	12.95	20.60	19.50	17.13
September	15.75	19.75	24.50	15.50	18.05	14.00	12.81	14.38	12.63	11.06	11.80	11.69	31.87	29.00	24.90	37.69	14.19	23.75	19.75	18.20
October	16.00	19.31	24.38	15.25	18.31	14.00	12.50	16.00	12.10	10.65	12.00	12.94	25.75	29.00	24.88	36.06	16.50	25.10	17.90	17.63
November	17.10	22.60	23.13	15.50	18.50	13.50	12.10	16.69	12.00	9.81	13.31	17.30	28.15	29.00	28.63	31.95	16.60	24.63	17.88	18.63
December	18.75	25.00	22.00	16.00	18.50	13.50	13.06	16.75	11.88	9.60	14.56	21.25	31.00	26.75	31.10	24.40	15.75	24.00	19.75	20 50
Average	*15 88*	*19.63*	*24.22*	*15.29*	*16.37*	*15.44*	*12.80*	*14.33*	*14.20*	*11 18*	*11.13*	*14.12*	*27.48*	*29.06*	*24.55*	*35.46*	*15.70*	*19.96*	*22.62*	*18.30*

Philadelphia Scrap Prices, 1904 to 1924, Delivered Eastern Pennsylvania

Heavy Melting Steel Scrap, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$11.56	$17.44	$17.33	$18.61	$11.70	$16.94	$17.00	$12.50	$12.19	$14.40	$10.40	$10.00	$16.38	$21.70	$30.00	$17.20	$21.75	$14.50	$11.60	$19.70	$18.20
February	12.56	17.37	16.62	18.69	14.25	15.58	16.62	13.50	11.70	12.87	11.00	10.00	16.50	20.63	30.00	14.75	25.62	14.25	12.00	20.75	18.38
March	14.00	17.62	15.80	18.87	13.12	13.50	16.50	14.05	11.80	13.25	11.31	10.80	16.90	23.50	29.00	14.19	25.20	13.00	12.78	25.25	16.75
April	14.69	17.56	16.69	18.75	12.75	13.25	16.12	13.31	12.94	13.34	10.95	11.00	17.88	24.88	28.00	15.50	24.12	11.25	14.00	23.63	15.30
May	12.50	15.94	16.30	18.95	12.81	14.75	14.75	13.00	13.50	12.10	10.63	11.25	16.60	25.40	29.00	15.00	23.37	11.80	14.75	19.80	14.75
June	11.35	14.55	15.75	18.75	13.25	15.81	14.45	13.00	13.50	11.75	10.50	11.10	15.31	24.13	29.00	16.12	22.60	11.25	15.00	17.88	15.00
July	11.12	15.16	15.87	17.62	13.80	15.80	14.12	13.19	13.50	11.35	10.30	12.06	14.94	25.20	29.00	18.90	22.62	11.00	15.00	16.60	15.40
August	11.75	15.55	16.75	16.85	14.50	16.87	13.75	13.15	13.65	11.43	10.19	13.75	14.75	31.88	29.00	19.37	25.00	11.40	15.20	16.00	16.75
September	11.90	15.69	17.94	16.50	15.19	17.40	13.85	12.50	14.50	11.62	10.69	15.00	14.75	30.25	29.00	18.62	25.62	11.50	16.88	16.75	17.10
October	12.87	16.56	18.12	15.35	15.00	18.00	13.81	11.94	15.10	11.15	9.93	14.75	15.63	25.00	29.00	19.10	23.75	12.06	17.80	15.40	16.63
November	14.75	17.55	18.70	12.94	15.75	18.00	13.50	11.55	15.50	10.19	9.25	14.65	20.13	26.00	28.00	20.62	19.00	11.88	16.25	15.25	17.75
December	16.20	17.50	19.50	11.50	17.10	17.50	12.65	12.06	15.25	10.00	9.40	15.81	23.75	28.20	25.00	22.50	15.25	11.50	16.38	16.75	19.88
Average	*12.94*	*16.54*	*17.11*	*16.96*	*14.10*	*16.12*	*14.78*	*12.81*	*13.69*	*11.96*	*10.33*	*12.51*	*16.96*	*27.83*	*28.67*	*17.66*	*22.99*	*12.12*	*14.80*	*18.65*	*16.82*

No. 1 Machinery Cast Scrap, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$12.75	$16.00	$16.00	$21.70	$15.30	$15.87	$17.00	$14.00	$13.42	$14.50	$12.00	$12.00	$17.00	$20.20	$30.00	$23.80	$36.00	$23.25	$16.50	$23.20	$20.70
February	12.81	15.62	15.87	22.00	15.00	15.00	16.12	14.38	13.00	14.37	12.88	12.00	17.00	20.00	30.00	23.00	40.00	23.00	16.50	24.25	20.25
March	13.30	15.75	15.50	22.25	15.00	14.00	16.00	14.40	13.12	14.00	13.00	12.00	17.00	21.75	30.00	21.25	39.20	19.40	17.13	28.25	18.63
April	13.37	16.00	15.50	21.25	15.00	14.10	15.87	13.44	13.62	13.94	13.00	11.75	17.88	26.63	29.00	22.00	38.00	18.00	17.25	26.25	17.70
May	12.50	15.19	15.40	20.80	14.87	14.69	15.06	13.13	13.75	13.60	12.25	12.13	17.50	29.00	29.00	21.50	37.75	18.00	18.40	24.30	17.00
June	11.60	14.20	15.37	20.75	14.25	15.00	15.00	13.00	13.75	13.25	12.00	12.25	16.50	33.50	29.00	22.00	37.00	17.38	19.00	22.25	17.50
July	11.25	14.00	15.12	19.25	11.00	14.85	14.94	13.06	13.75	13.00	12.00	12.38	16.00	36.30	29.00	22.10	37.50	16.50	17.50	20.40	17.50
August	11.50	14.40	16.30	18.60	14.25	15.37	14.25	13.20	13.75	12.87	12.00	13.30	16.00	33.25	29.00	24.75	39.00	17.00	18.60	20.38	17.88
September	11.50	15.12	17.44	18.00	15.25	15.90	14.00	12.69	14.96	12.81	12.00	14.00	16.00	31.00	29.00	25.00	39.25	17.00	21.50	21.38	18.00
October	12.37	15.75	18.37	17.60	15.25	16.94	14.00	12.44	14.50	13.50	11.40	14.00	16.15	28.00	29.00	25.20	38.75	17.13	22.60	19.50	17.50
November	13.75	16.00	19.20	16.50	15.44	17.50	14.00	12.25	14.75	12.62	11.00	14.50	18.50	30.00	29.00	27.62	33.80	17.50	21.00	19.25	17.88
December	14.90	16.00	21.12	15.50	16.00	17.50	14.00	13.00	15.00	12.17	11.30	16.06	20.75	30.60	29.00	30.75	24.50	16.63	20.25	20.25	19.25
Average	*12.63*	*15.34*	*16.43*	*19.52*	*14.97*	*15.56*	*15.02*	*13.26*	*13.95*	*13.39*	*12.07*	*13.03*	*17.19*	*28.35*	*29.25*	*24.08*	*38.73*	*18.49*	*18.85*	*22.47*	*18.32*

No. 1 Railroad Wrought, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$15.12	$20.75	$21.16	$22.55	$14.30	$19.50	$19.56	$15.63	$15.37	$16.10	$13.05	$12.00	$22.00	$26.60	$35.00	$24.20	$33.50	$20.00	$14.50	$22.10	$20.90
February	15.75	21.50	19.87	21.50	15.94	17.75	18.94	16.06	14.00	15.12	14.38	12.00	21.63	25.50	35.00	21.50	36.00	19.75	14.63	24.75	21.50
March	17.20	22.37	19.20	21.12	15.31	15.00	19.00	17.20	14.12	15.25	14.00	12.50	22.13	30.75	35.00	20.25	35.90	17.20	15.38	27.50	19.00
April	17.75	22.50	20.00	20.50	15.00	15.25	18.69	16.06	15.44	15.37	13.25	12.69	23.38	36.00	35.00	21.60	35.00	17.00	15.88	27.00	18.10
May	15.75	18.75	19.20	20.60	15.00	17.12	17.50	15.25	15.75	15.00	12.63	12.94	22.50	41.40	34.00	21.00	33.50	15.20	16.90	24.20	16.63
June	13.00	16.00	17.87	20.75	15.25	18.19	16.70	15.00	15.44	14.75	12.50	13.00	20.50	51.25	34.00	21.50	33.00	14.38	17.00	23.50	16.50
July	12.69	16.16	17.50	19.12	15.95	17.45	16.00	15.13	15.50	13.90	12.20	13.44	19.50	50.60	34.00	21.40	33.00	13.50	17.13	18.80	17.70
August	13.44	18.80	19.70	18.30	17.50	18.87	15.37	15.70	15.80	14.00	12.00	14.95	20.20	45.00	34.00	26.50	33.00	14.00	18.00	18.00	18.63
September	14.45	20.50	21.25	18.00	18.25	19.95	16.10	14.75	16.31	14.68	12.38	16.50	20.00	44.00	34.00	26.50	33.25	15.00	20.88	18.50	19.00
October	15.37	21.62	22.25	17.50	18.30	20.75	16.19	13.94	16.80	14.00	11.80	16.13	21.63	37.20	34.00	26.90	29.25	15.88	22.20	17.50	18.00
November	17.00	22.70	22.25	15.75	19.19	20.75	16.00	13.85	17.06	13.00	11.50	16.50	24.13	35.00	34.00	28.37	25.00	16.00	19.00	17.38	18.38
December	19.10	21.87	23.25	14.62	19.95	19.50	15.90	15.00	16.25	12.75	11.50	20.06	26.75	35.00	33.00	30.25	20.00	14.63	19.25	18.50	20.25
Average	*15.55*	*20.29*	*20.29*	*19.19*	*16.66*	*18.34*	*17.16*	*15.80*	*15.65*	*14.49*	*12.60*	*14.39*	*23.03*	*33.19*	*34.25*	*24.41*	*31.70*	*16.04*	*17.56*	*21.39*	*18.78*

Old Cast Iron Carwheels, per Gross Ton

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$12.87	$16.00	$18.75	$23.00	$18.20	$16.00	$17.50	$13.00	$12.37	$16.20	$12.20	$11.00	$16.38	$21.50	$30.00	$24.60	$36.00	$25.00	$16.50	$22.30	$20.10
February	13.00	16.00	18.75	23.00	16.62	15.50	16.81	13.44	12.00	15.37	12.63	10.63	16.50	20.50	30.00	23.00	40.62	24.00	15.00	24.75	20.38
March	13.20	16.70	17.70	23.62	15.00	14.00	16.75	14.00	11.94	15.00	12.50	11.00	16.70	21.50	30.00	23.00	42.40	18.50	15.94	26.50	18.75
April	13.50	17.00	16.75	24.00	14.00	14.05	16.06	13.19	12.87	14.87	12.00	11.00	17.38	25.75	29.00	23.10	40.00	18.00	15.88	26.50	17.50
May	12.00	16.00	16.75	24.80	14.00	14.25	15.12	13.00	13.90	13.75	11.75	11.38	16.70	28.00	29.00	21.00	40.00	16.80	16.70	24.20	17.00
June	11.20	14.90	16.69	25.37	13.75	15.00	14.90	13.10	14.00	13.12	11.19	11.55	16.38	34.00	29.00	22.00	38.00	18.00	17.13	22.75	17.00
July	10.75	14.25	16.19	25.00	13.50	15.05	14.25	12.94	14.00	12.80	11.00	12.38	15.63	36.20	29.00	23.20	38.50	16.50	17.50	20.40	17.30
August	11.25	15.20	16.75	23.90	14.75	15.62	13.94	13.00	14.05	12.37	11.25	13.25	15.50	34.50	29.00	24.50	40.60	16.40	18.10	20.25	17.75
September	11.80	15.50	18.27	23.00	15.00	16.80	13.75	12.56	14.25	12.75	11.25	14.00	15.50	32.50	29.00	24.50	42.75	17.00	21.75	21.00	18.00
October	12.37	16.37	20.94	22.40	15.00	17.50	13.75	11.75	14.87	12.46	10.10	13.75	15.88	29.00	29.00	24.50	40.50	17.00	22.50	19.60	17.50
November	13.81	17.10	22.00	19.00	15.62	17.50	13.50	11.35	15.00	12.00	9.50	14.05	18.88	31.25	29.00	27.75	36.40	17.20	20.50	17.75	17.88
December	14.60	18.12	23.00	19.00	16.00	17.50	13.25	12.33	15.50	12.00	10.00	15.63	22.38	32.40	28.00	30.50	26.00	16.63	20.00	19.50	19.13
Average	*12.53*	*16.10*	*18.55*	*23.01*	*15.12*	*15.73*	*14.97*	*12.81*	*13.75*	*13.59*	*11.98*	*13.47*	*16.99*	*28.95*	*29.17*	*24.30*	*38.48*	*18.42*	*18.13*	*23.1?*	*18.53*

Scrap Prices at Pittsburgh, per Gross Ton

Heavy Melting Steel

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January	$12.50	$16.25	$17.25	$18.95	$12.80	$16.63	$17.69	$13.50	$12.75	$14.95	$10.90	$11.63	$17.50	$22.60	$30.00	$19.00	$26 30	$15.50	$14.30	$21.80	$21.38
February	13.50	15.88	16.31	18.06	13.88	15.63	17.25	14.13	12.12	14.19	12.62	11.63	17.06	21.75	30.00	14.75	27.75	16.00	14.00	23.25	20.88
March	14.00	15.90	14.70	18.00	13.19	14.19	16.80	14.35	12.62	14.19	12.12	12.00	18.45	23.25	30.00	14.00	27.25	14.00	15.13	25.38	19.38
April	13.63	16.00	14.75	17.94	12.80	14.00	16.50	13.06	13.06	14.19	12.00	11.81	17.81	28.00	28.50	15.20	26.00	12.63	16.38	25.88	16.20
May	12.13	15.00	14.80	18.10	12.81	14.81	15.30	12.63	13.25	13.55	12.00	11.75	16.95	28.80	28.50	14.75	25.00	13.30	17.30	22.80	15.63
June	11.30	13.90	15.63	18.38	13.13	15.69	15.10	12.95	13.44	12.62	12.00	11.75	15.88	41.00	28.62	17.12	25.00	12.69	17.00	21.13	16.00
July	10.75	14.00	15.75	18.06	14.25	15.90	14.50	13.06	13.31	12.40	12.00	12.31	16.31	39.00	29.00	19.70	26.00	12.00	17.38	18.10	17.50
August	11.38	14.85	16.50	17.75	14.81	16.31	14.31	13.20	13.55	12.37	11.50	13.81	16.05	32.83	29.00	21.00	28.13	12.70	17.75	17.75	17.50
September	11.50	15.88	16.88	17.38	14.25	17.40	14.35	12.50	14.11	12.25	11.31	14.30	16.19	33.25	29.00	19.20	29.00	13.63	20.13	17.88	18.10
October	12.25	16.50	17.13	17.10	15.20	17.94	14.25	12.06	15.85	11.85	10.85	14.38	18.25	28.80	29.00	19.00	27.75	14.13	21.40	15.70	18.50
November	14.25	17.50	18.00	14.88	16.06	17.50	14.25	12.00	15.13	11.44	10.00	15.88	21.20	29.50	28.87	22.25	23.50	14.30	20.50	16.13	19.63
December	16.20	17.63	20.00	13.00	16.70	18.00	13.75	12.31	14.75	11.08	10.75	17.45	26.00	30.00	26.87	24.25	17.20	14.25	20.13	18.75	21.25
Average	*12.73*	*15.77*	*16.48*	*17.30*	*14.51*	*16.17*	*15.34*	*12.98*	*13.66*	*12.92*	*11.50*	*13.23*	*18.14*	*29.90*	*28.95*	*18.35*	*25.74*	*13.76*	*17.69*	*20.33*	*18.50*

No. 1 Cast Cupola Scrap

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Jan.	$11.25	$15.50	$19.62	$30.00	$24.20	$32.00	$25.00	$16.30	$23.30	$21.00
Feb.	11.25	15.62	19.00	30.00	18.75	34.00	22.75	16.00	24.75	21.38
March	11.44	16.05	20.60	30.00	18.00	34.00	21.20	15.94	26.75	20.25
April	11.90	16.12	23.75	29.00	19.00	33.00	18.00	16.88	27.75	18.50
May	12.00	16.15	24.90	28.50	17.20	32.00	18.00	18.50	26.30	17.88
June	12.12	15.90	34.75	28.62	18.50	32.00	16.63	18.75	24.13	17.25
July	12.15	15.56	34.25	29.00	20.40	40.20	16.00	19.00	21.10	17.80
Aug.	12.62	14.80	31.60	29.00	23.50	41.25	16.20	19.00	21.38	18.00
Sept.	13.00	14.62	30.00	29.00	23.50	42.00	16.88	22.13	21.75	18.00
Oct.	13.06	15.75	28.25	29.00	23.80	39.75	17.50	24.00	19.50	18.00
Nov.	13.75	17.20	26.20	29.00	27.25	34.25	17.10	23.13	18.63	18.13
Dec.	15.15	21.87	29.00	27.00	28.75	27.25	16.13	22.38	20.00	18.88
Aver.	*12.48*	*15.93*	*26.83*	*29.01*	*21.90*	*35.14*	*18.45*	*19.33*	*22.95*	*18.76*

Machine Shop Turnings

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Jan.	$7.69	$9.87	$11.44	$20.00	$11.20	$15.50	$10.00	$9.60	$16.90	$15.75
Feb.	7.81	9.50	12.00	20.00	8.50	17.88	10.00	9.56	18.50	16.13
March	7.62	10.35	11.70	20.00	9.00	18.00	9.40	10.50	20.38	14.50
April	7.85	10.60	13.44	18.50	10.12	16.70	8.13	11.88	20.80	12.45
May	7.75	9.80	14.30	18.00	11.62	15.38	8.70	13.30	19.20	11.88
June	7.94	9.10	20.75	18.00	9.68	14.75	7.56	13.32	17.19	13.00
July	7.95	8.21	20.50	18.80	11.60	13.40	7.00	14.00	12.10	13.50
Aug.	8.25	7.50	18.60	19.00	13.50	15.25	7.85	14.00	11.44	14.13
Sept.	8.65	7.06	21.00	19.00	12.25	16.30	9.06	14.75	12.88	14.40
Oct.	8.37	7.50	19.00	19.00	12.75	15.88	9.56	16.20	11.60	14.25
Nov.	8.62	8.70	18.00	19.00	14.00	14.63	9.85	16.63	11.63	15.94
Dec.	9.55	12.75	19.25	17.50	14.25	10.50	8.88	15.63	13.75	17.13
Aver.	*8.17*	*9.25*	*16.66*	*18.90*	*11.54*	*15.35*	*8.83*	*13.98*	*15.51*	*14.42*

Compressed Sheets

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Jan.	$10.38	$16.13	$19.00	$26.00	$16.50	$23.00	$13.00	$11.80	$20.50	$18.88
Feb.	10.25	16.06	18.00	26.00	13.25	23.75	13.00	12.00	21.75	19.63
March	10.25	16.25	18.50	26.00	11.40	23.00	12.00	13.13	23.75	17.50
April	10.25	16.00	21.50	24.40	13.00	22.13	10.50	14.63	24.75	14.60
May	10.25	15.30	22.30	26.00	12.75	22.00	10.80	15.10	24.30	13.75
June	10.55	14.75	31.50	27.25	14.30	22.00	10.13	15.13	19.88	14.38
July	11.63	14.25	31.40	29.00	15.00	21.50	9.38	15.50	16.90	15.70
Aug.	12.69	13.50	25.75	29.00	17.88	23.90	10.00	16.10	16.13	16.00
Sept.	13.00	13.50	25.00	29.00	18.00	24.25	10.06	17.88	16.00	16.55
Oct.	13.00	14.25	23.00	29.00	18.00	22.75	12.00	19.50	14.30	16.50
Nov.	13.55	16.60	22.00	29.00	18.00	19.80	12.00	19.50	14.25	17.75
Dec.	16.00	21.25	25.50	23.80	19.80	14.75	11.69	19.38	16.50	19.25
Aver.	*11.82*	*15.65*	*23.68*	*27.04*	*15.66*	*21.90*	*11.22*	*15.80*	*19.08*	*16.71*

Cast Iron Borings

	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
Jan.	$8.19	$10.75	$11.81	$20.00	$15.00	$18.70	$13.00	$10.90	$18.40	$16.94
Feb.	7.94	10.69	12.25	20.00	10.37	20.25	12.00	11.06	19.50	16.88
March	8.06	11.05	13.10	20.00	9.75	19.50	11.45	11.94	21.13	15.38
April	8.25	10.94	14.25	18.50	10.62	18.60	9.38	13.38	21.88	13.00
May	8.25	9.95	15.25	18.50	10.60	17.38	9.70	14.10	20.20	12.75
June	8.44	8.95	22.25	18.50	11.19	16.75	8.38	14.63	17.88	14.00
July	8.70	8.31	21.25	18.90	13.20	18.00	7.63	16.00	15.20	13.80
Aug.	9.19	7.70	19.60	19.00	15.25	19.63	8.20	15.70	13.88	14.75
Sept.	9.40	8.12	22.00	19.00	15.38	20.20	9.00	17.00	15.63	14.90
Oct.	9.31	8.87	20.00	19.00	17.90	19.00	10.13	18.60	13.50	15.00
Nov.	9.69	10.10	18.60	19.00	17.50	17.38	10.40	17.85	12.75	15.13
Dec.	10.50	14.00	19.25	17.50	17.75	14.00	9.25	17.50	14.88	16.75
Aver.	*8.83*	*9.95*	*17.38*	*18.99*	*13.71*	*18.38*	*9.88*	*14.89*	*17.07*	*14.94*

Metals, Tin Plate and Sheets for Twenty-One Years

Lake Copper, at New York, Cents per Pound (1920 to 1924 Prices are Electrolytic Copper)

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	12.62	15.18	18.78	24.41	13.90	14.56	14.00	12.81	14.50	16.98	14.85	14.02	24.39	29.73	23.50	20.48	19.27	12.95	13.55	14.52	12.46
February..	12.34	15.25	17.94	25.10	13.13	13.37	13.78	12.75	14.41	15.55	15.00	15.21	26.85	34.90	23.50	17.86	19.02	12.84	12.92	15.34	12.73
March.....	12.60	15.25	18.50	23.38	12.85	12.90	13.75	12.58	14.88	15.05	14.79	15.75	27.10	35.85	23.50	15.46	18.50	12.19	12.68	16.84	13.52
April.....	13.19	15.18	18.62	24.62	13.09	12.94	13.31	12.41	16.00	15.67	14.75	18.90	28.27	31.67	23.50	15.55	19.19	12.49	12.61	16.81	13.21
May.....	13.28	15.00	18.70	24.10	12.88	13.21	13.06	12.33	16.30	15.91	14.40	21.00	28.88	31.42	23.50	16.18	19.05	12.79	13.13	15.54	12.76
June.....	12.74	15.00	18.69	23.94	13.00	13.50	12.88	12.71	17.53	15.42	14.12	23.38	27.82	32.46	23.50	17.95	19.00	12.88	13.62	14.74	13.35
July.....	12.62	15.03	18.47	21.95	13.00	13.34	12.66	12.78	17.54	14.78	13.70	21.98	25.84	28.78	25.80	22.07	19.00	12.46	13.71	14.39	12.39
August....	12.50	16.07	18.65	18.94	13.71	13.56	12.93	12.75	17.73	15.86	12.85	19.33	26.95	27.24	26.00	23.16	19.00	11.70	13.74	13.87	13.26
September.	12.67	16.12	19.31	16.41	13.80	13.50	12.81	12.65	17.77	16.77	12.66	17.97	28.03	24.90	26.00	22.68	18.70	12.01	13.75	13.86	12.97
October...	13.09	16.62	21.81	13.80	13.81	13.19	12.84	12.53	17.80	16.85	11.73	17.89	28.48	23.50	26.00	22.13	16.56	12.67	13.66	12.58	12.96
November.	14.22	16.90	22.50	13.94	14.44	13.44	12.98	12.80	17.70	16.16	12.00	18.92	32.32	23.50	26.00	20.69	14.63	13.07	13.62	12.76	13.59
December..	14.87	18.75	23.06	13.48	14.53	13.80	13.00	13.84	17.69	14.88	13.35	20.24	33.38	23.50	25.40	18.90	13.63	13.55	14.00	12.88	14.09
Average..	*13.06*	*15.86*	*19.59*	*20.34*	*13.51*	*13.44*	*13.17*	*12.75*	*16.65*	*15.82*	*13.68*	*18.72*	*28.19*	*28.95*	*24.68*	*19.43*	*17.96*	*12.63*	*13.42*	*14.47*	*13.08*

Spelter at New York, Cents per Pound

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	4.95	6.17	6.48	6.90	4.54	5.15	6.26	5.55	6.52	7.15	5.29	6.59	18.19	9.94	7.88	7.38	9.62	5.83	5.06	7.28	6.78
February..	4.95	6.12	6.09	7.00	4.78	4.99	5.89	5.56	6.71	6.45	5.40	8.84	20.13	10.48	7.99	6.70	9.14	5.36	4.85	7.58	7.11
March.....	5.05	6.06	5.96	6.92	4.76	4.81	5.72	5.65	6.98	6.26	5.26	9.29	18.40	10.77	7.64	6.52	8.93	5.20	5.00	8.19	6.85
April.....	5.22	5.97	6.05	6.81	4.68	4.94	5.60	5.51	6.86	5.77	5.18	11.22	18.58	9.85	7.01	6.51	8.63	5.24	5.25	7.65	6.49
May.....	5.14	5.55	5.95	6.51	4.60	5.12	5.20	5.50	6.86	5.47	5.06	16.14	15.86	9.46	7.32	6.46	8.08	5.28	5.45	6.99	6.13
June.....	4.79	5.32	6.14	6.45	4.56	5.39	5.19	5.63	6.99	5.18	5.09	22.18	12.75	9.62	8.01	6.93	7.92	4.95	5.69	6.40	6.14
July.....	4.85	5.38	5.98	6.15	4.46	5.35	5.20	5.79	7.26	5.38	5.02	20.58	9.83	8.95	8.60	7.90	8.18	4.77	6.12	6.43	6.25
August....	4.85	5.66	6.06	5.71	4.71	5.74	5.26	6.04	7.19	5.75	5.60	14.11	8.98	8.69	8.96	7.84	8.31	4.69	6.59	6.68	6.53
September.	5.06	5.83	6.19	5.28	4.76	5.85	5.53	6.03	7.53	5.82	5.50	14.16	8.22	8.34	9.60	7.57	7.82	4.74	6.91	6.81	6.54
October....	5.17	6.05	6.18	5.45	4.81	6.09	5.69	6.20	7.57	5.42	4.97	13.96	9.98	8.24	9.11	7.83	7.51	5.10	7.20	6.66	6.67
November.	5.49	6.17	6.36	5.10	5.03	6.32	5.95	6.60	7.48	5.29	5.12	17.15	11.90	7.95	8.70	8.14	6.84	5.18	7.48	6.70	7.14
December..	5.80	6.50	6.62	4.39	5.17	6.35	5.80	6.44	7.33	5.18	5.71	16.69	11.13	7.84	8.45	8.56	6.00	5.25	7.46	6.60	7.60
Average..	*5.11*	*5.90*	*6.17*	*6.06*	*4.74*	*5.51*	*5.61*	*5.88*	*7.11*	*5.76*	*5.27*	*14.24*	*13.66*	*9.18*	*8.28*	*7.36*	*8.08*	*5.13*	*6.09*	*7.00*	*6.69*

Lead, at New York, Cents per Pound

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	4.39	4.56	5.86	6.30	3.73	4.19	4.70	4.50	4.41	4.35	4.11	3.74	5.93	7.69	6.87	5.56	8.67	5.00	4.70	7.85	8.31
February..	4.40	4.50	5.56	6.31	3.75	4.07	4.63	4.46	4.00	4.35	4.06	3.82	6.23	9.13	7.04	5.05	8.88	4.54	4.70	8.14	9.01
March.....	4.50	4.45	5.35	6.31	3.88	4.02	4.51	4.41	4.08	4.35	3.97	4.04	7.43	9.47	7.24	5.23	9.21	4.08	4.71	8.47	9.23
April.....	4.50	4.50	5.39	6.16	4.02	4.19	4.40	4.44	4.20	4.40	3.82	4.20	7.73	9.43	6.95	5.03	8.95	4.33	5.13	8.19	8.19
May.....	4.48	4.50	5.90	6.02	4.26	4.32	4.37	4.40	4.20	4.37	3.90	4.25	7.45	11.00	6.88	5.05	8.55	4.99	5.51	7.39	7.27
June.....	4.22	4.51	5.94	5.75	4.45	4.36	4.38	4.46	4.50	4.35	3.90	5.89	6.87	11.68	7.55	5.34	8.48	4.56	5.73	7.14	7.08
July.....	4.17	4.56	5.80	5.24	4.50	4.35	4.40	4.50	4.67	4.37	3.90	5.59	6.34	10.72	8.04	5.65	8.67	4.40	5.75	6.28	7.15
August....	4.15	4.64	5.78	5.12	4.59	4.36	4.40	4.50	4.54	4.64	3.87	4.68	6.26	10.72	8.05	5.77	8.98	4.40	5.88	6.74	8.02
September.	4.20	4.85	5.92	4.84	4.54	4.39	4.40	4.49	5.04	4.73	3.86	4.62	6.88	8.84	8.05	6.12	8.11	4.60	6.20	7.06	8.09
October....	4.20	5.07	5.94	4.64	4.34	4.39	4.40	4.31	5.06	4.52	3.52	4.60	7.00	6.77	8.05	6.45	7.24	4.70	6.67	6.84	8.31
November.	4.51	5.48	5.97	4.45	4.39	4.40	4.44	4.31	4.66	4.33	3.68	5.16	7.13	6.44	8.05	6.76	6.33	4.70	7.20	6.87	8.96
December..	4.60	5.96	6.19	3.76	4.24	4.56	4.50	4.45	4.32	4.06	3.80	5.33	7.60	6.48	6.71	7.03	4.80	4.70	7.28	7.61	9.41
Average..	*4.36*	*4.80*	*5.80*	*5.41*	*4.22*	*4.30*	*4.48*	*4.44*	*4.47*	*4.40*	*3.87*	*4.66*	*6.90*	*9.03*	*7.46*	*5.76*	*8.07*	*4.58*	*5.79*	*7.39*	*8.25*

Straits Tin, at New York, Cents per Pound

	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	28.75	29.18	36.36	42.14	27.43	28.19	32.61	41.20	44.58	50.34	39.12	34.13	41.76	44.10	85.13	71.50	62.74	35.94	32.03	39.16	48.70
February..	27.98	29.49	36.48	42.16	28.74	28.44	32.65	43.34	43.56	48.71	39.82	37.25	42.60	51.47	85.00	72.45	59.87	32.16	30.74	41.98	53.41
March.....	26.19	29.21	36.62	41.29	30.46	28.75	32.51	41.10	42.76	46.93	38.03	48.73	50.53	58.38	85.00	72.50	61.93	28.79	29.14	48.61	55.03
April.....	27.99	30.43	38.86	40.84	31.79	29.35	32.83	42.05	43.64	49.04	36.10	47.64	51.51	55.82	88.53	72.50	62.12	30.36	30.58	45.84	50.02
May.....	27.76	30.04	43.08	43.01	29.84	29.07	33.05	43.32	45.98	49.06	33.21	38.79	49.14	63.21	100.00	72.50	54.99	32.50	30.92	43.11	44.08
June.....	26.14	30.36	38.97	42.65	28.18	29.26	32.79	46.25	47.44	45.01	30.60	40.26	42.07	61.93	91.00	71.83	48.34	29.39	31.46	40.97	42.74
July.....	26.28	31.71	37.18	41.15	28.92	29.05	32.99	43.23	44.70	41.32	35.65	37.38	38.25	62.61	93.00	70.11	49.29	27.69	31.67	38.47	46.29
August....	26.74	32.85	39.90	37.35	29.99	29.96	33.92	43.38	45.86	41.63	48.34	34.37	38.88	62.53	91.33	62.20	47.60	26.35	32.36	39.33	51.89
September.	27.27	32.21	40.32	37.22	28.91	30.00	35.17	39.69	49.16	42.63	31.13	33.13	38.65	61.54	80.40	59.79	44.43	26.70	32.36	41.60	49.24
October....	28.53	32.47	42.90	32.33	29.44	30.41	36.76	41.23	50.07	40.38	30.25	33.05	41.10	62.24	78.82	54.82	40.47	27.70	34.61	41.80	50.60
November.	29.00	33.46	42.70	30.81	30.43	30.74	37.38	43.08	49.67	39.75	33.28	39.50	44.12	74.18	73.67	54.17	36.97	28.93	36.76	44.09	54.25
December..	29.27	35.84	42.62	27.92	29.13	32.91	38.21	45.03	49.86	37.12	34.01	38.53	42.55	84.74	71.51	53.80	34.04	32.41	37.48	47.16	55.20
Average..	*27.66*	*31.44*	*39.67*	*38.24*	*29.44*	*29.68*	*34.84*	*42.74*	*46.46*	*44.33*	*35.80*	*38.56*	*43.43*	*61.90*	*85.28*	*65.68*	*50.23*	*29.91*	*32.51*	*42.68*	*50.12*

Tin Plate, at Pittsburgh, Dollars per Base Box

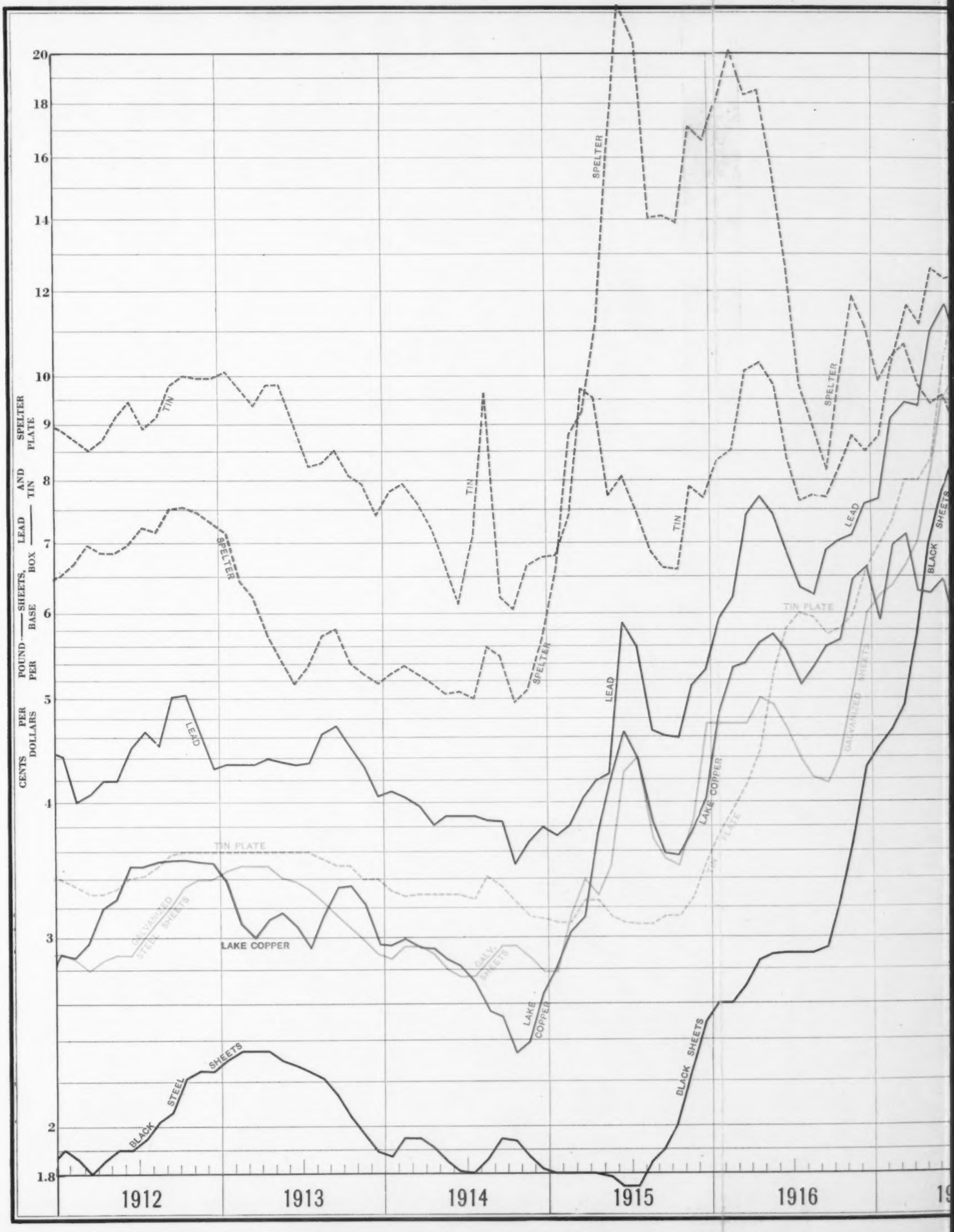
	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	$3.56	$3.55	$3.47	$3.90	$3.74	$3.70	$3.60	$3.60	$3.40	$3.60	$3.32	$3.10	$3.75	$7.00	$7.75	$7.35	$7.00	$7.00	$4.75	$4.75	$5.50
February..	3.45	3.55	3.50	3.90	3.70	3.70	3.60	3.67	3.35	3.60	3.29	3.10	3.96	7.38	7.75	7.35	7.00	7.00	4.71	4.80	5.50
March.....	3.45	3.55	3.50	3.90	3.70	3.53	3.60	3.70	3.30	3.60	3.30	3.25	4.19	8.00	7.75	7.26	7.00	7.00	4.60	5.23	5.50
April.....	3.45	3.55	3.57	3.90	3.70	3.40	3.60	3.70	3.30	3.60	3.30	3.25	4.50	8.00	7.75	7.00	7.00	6.44	4.75	6.00	5.50
May.....	3.45	3.55	3.66	3.90	3.70	3.40	3.60	3.70	3.33	3.60	3.30	3.15	5.30	8.40	7.75	7.00	7.00	6.25	4.75	5.70	5.50
June.....	3.45	3.55	3.75	3.90	3.70	3.40	3.60	3.70	3.40	3.60	3.30	3.11	5.81	10.50	7.75	7.00	7.00	6.25	4.75	5.50	5.50
July.....	3.41	3.55	3.75	3.90	3.70	3.40	3.60	3.70	3.43	3.60	3.27	3.10	6.00	12.00	7.75	7.00	7.50	5.69	4.75	5.50	5.50
August....	3.30	3.55	3.75	3.90	3.70	3.40	3.60	3.70	3.50	3.55	3.41	3.10	5.95	11.40	7.75	7.00	9.00	5.25	4.75	5.50	5.50
September.	3.30	3.55	3.75	3.90	3.70	3.40	3.60	3.67	3.58	3.50	3.35	3.15	5.75	12.00	7.75	7.00	9.00	5.25	4.75	5.50	5.50
October....	3.30	3.34	3.75	3.90	3.70	3.50	3.60	3.52	3.60	3.50	3.24	3.15	5.81	.....	7.75	7.00	8.33	5.13	4.75	5.50	5.50
November.	3.39	3.34	3.90	3.90	3.70	3.56	3.60	3.40	3.60	3.40	3.15	3.28	5.97	7.75	7.75	7.00	7.50	4.75	4.75	5.50	5.50
December..	3.47	3.40	3.90	3.90	3.70	3.60	3.60	3.40	3.60	3.40	3.13	3.52	6.63	7.75	7.55	7.00	7.00	4.73	4.75	5.50	5.50
Average..	*3.42*	*3.50*	*3.09*	*3.90*	*3.70*	*3.50*	*3.60*	*3.62*	*3.45*	*3.55*	*3.28*	*3.19*	*5.30*	*9.11*	*7.73*	*7.08*	*7.53*	*5.90*	*4.73*	*5.42*	*5.50*

No. 28 Black Sheets, at Pittsburgh, Cents per Pound

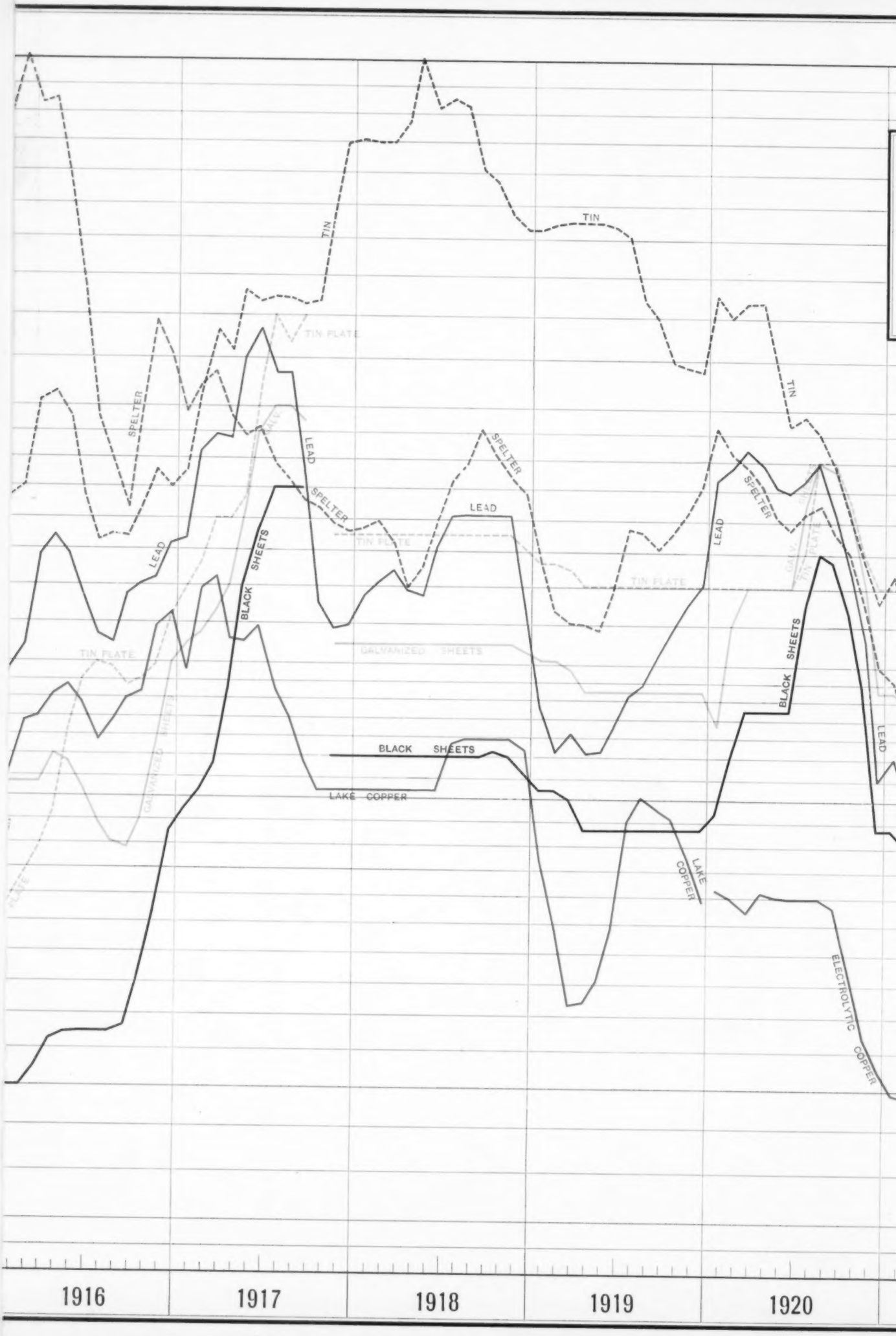
	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	2.29	2.30	2.40	2.60	2.52	2.50	2.40	2.20	1.90	2.31	1.87	1.80	2.60	4.50	5.00	4.70	4.48	4.35	3.00	3.35	3.83
February..	2.28	2.30	2.40	2.60	2.50	2.50	2.40	2.20	1.87	2.35	1.95	1.80	2.60	4.69	5.00	4.70	5.00	4.21	3.00	3.46	3.85
March.....	2.27	2.34	2.38	2.60	2.50	2.25	2.40	2.20	1.80	2.35	1.95	1.80	2.71	4.94	5.00	4.61	5.50	3.88	3.00	3.71	3.78
April.....	2.25	2.40	2.35	2.60	2.50	2.20	2.40	2.20	1.86	2.35	1.91	1.80	2.85	5.75	5.00	4.35	5.50	3.88	3.11	4.00	3.71
May..	2.20	2.40	2.35	2.60	2.50	2.20	2.40	2.20	1.90	2.30	1.85	1.79	2.89	7.00	5.00	4.35	5.50	4.00	3.15	3.88	3.60
June.....	2.16	2.30	2.50	2.60	2.50	2.20	2.40	2.00	1.90	2.27	1.81	1.75	2.90	7.88	5.00	4.35	5.50	3.80	3.15	3.85	3.53
July.....	2.10	2.26	2.50	2.60	2.50	2.20	2.24	2.00	1.95	2.25	1.80	1.75	2.90	8.50	5.00	4.35	6.75	3.31	3.15	3.81	3.46
August....	2.10	2.26	2.50	2.60	2.50	2.20	2.21	1.99	2.02	2.21	1.86	1.85	2.90	8.50	5.00	4.35	7.50	2.90	3.23	3.75	3.45
September.	2.10	2.25	2.50	2.60	2.50	2.26	2.15	1.91	2.07	2.14	1.95	1.90	2.93	8.50	5.00	4.35	7.38	2.81	3.35	3.75	3.50
October....	2.10	2.25	2.50	2.60	2.50	2.30	2.20	1.85	2.21	2.04	1.94	2.03	3.23	....	5.05	4.35	6.69	3.00	3.47	3.75	3.50
November.	2.13	2.27	2.60	2.60	2.50	2.30	2.20	1.85	2.25	1.97	1.87	2.25	3.65	5.00	5.00	4.35	5.77	2.86	3.35	3.75	3.50
December..	2.22	2.30	2.60	2.60	2.50	2.40	2.19	1.84	2.25	1.89	1.82	2.50	4.31	5.00	4.85	4.35	4.35	3.00	3.35	3.75	3.54
Average..	*2.18*	*2.30*	*2.47*	*2.60*	*2.50*	*2.29*	*2.30*	*2.04*	*2.00*	*2.20*	*1.88*	*1.92*	*3.04*	*6.39*	*4.99*	*4.43*	*5.83*	*3.50*	*3.19*	*3.73*	*3.60*

No. 28 Galvanized Sheets, at Pittsburgh, Cents per Pound

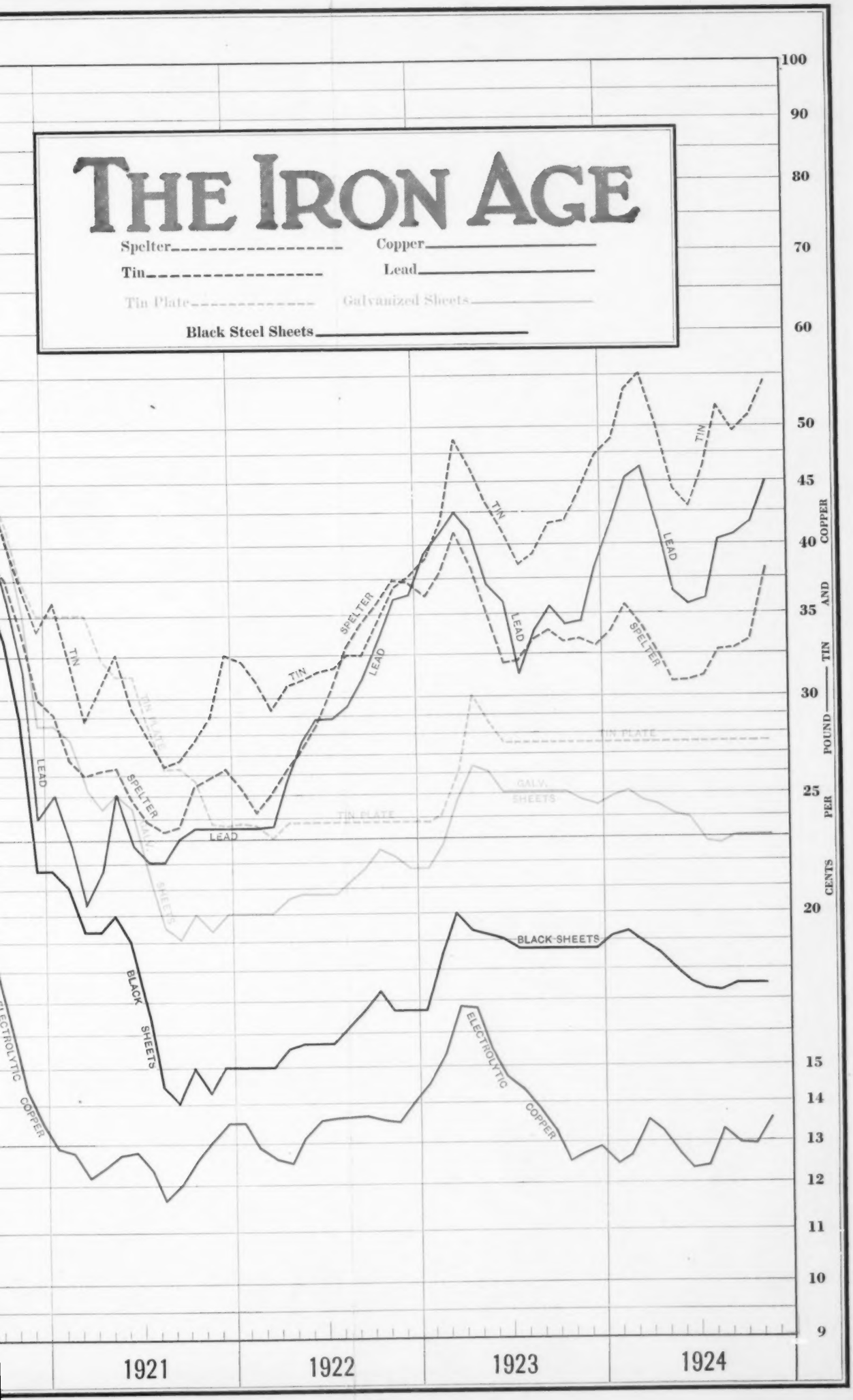
	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924
January...	3.36	3.35	3.45	3.67	3.59	3.55	3.50	3.20	2.90	3.46	2.87	2.79	4.75	6.25	6.25	6.05	5.33	5.70	4.00	4.35	4.98
February..	3.25	3.40	3.45	3.75	3.55	3.51	3.50	3.20	2.87	3.50	2.95	3.16	4.75	6.38	6.25	6.05	6.50	5.56	4.00	4.54	5.00
March.....	3.23	3.45	3.43	3.75	3.55	3.26	3.50	3.20	2.80	3.50	2.95	3.40	4.75	6.69	6.25	5.96	7.00	5.05	4.00	4.93	4.93
April.....	3.23	3.45	3.40	3.75	3.55	3.25	3.50	3.20	2.86	3.50	2.91	3.29	5.00	7.00	6.25	5.70	7.00	4.88	4.11	5.25	4.88
May.....	3.23	3.45	3.40	3.75	3.55	3.25	3.50	3.20	2.90	3.42	2.80	3.50	4.94	8.20	6.25	5.70	7.00	5.00	4.15	5.20	4.80
June.....	3.18	3.35	3.55	3.75	3.55	3.25	3.50	3.00	2.90	3.38	2.75	4.28	4.69	9.50	6.25	5.70	7.00	4.88	4.15	5.00	4.76
July.....	3.14	3.36	3.55	3.75	3.55	3.25	3.39	3.00	3.00	3.33	2.75	4.40	4.38	10.00	6.25	5.70	8.25	4.31	4.15	5.00	4.56
August....	3.14	3.32	3.55	3.75	3.55	3.25	3.30	2.99	3.12	3.24	2.85	3.71	4.21	10.00	6.25	5.70	9.00	3.90	4.23	5.00	4.55
September.	3.14	3.30	3.55	3.75	3.55	3.28	3.21	2.93	3.21	3.16	2.95	3.56	4.18	9.75	6.25	5.70	8.88	3.81	4.35	5.00	4.60
October....	3.14	3.30	3.58	3.75	3.55	3.35	3.20	2.85	3.36	3.08	2.95	3.50	4.41	....	6.25	5.70	8.18	4.00	4.50	5.00	4.60
November.	3.23	3.32	3.65	3.75	3.55	3.43	3.20	2.85	3.40	2.98	2.88	3.89	5.18	6.25	6.25	5.70	7.04	3.86	4.43	4.93	4.60
December..	3.31	3.35	3.65	3.75	3.55	3.50	3.19	2.89	3.40	2.90	2.78	4.75	6.00	6.25	6.15	5.70	5.70	4.00	4.35	4.89	4.72
Average..	*3.22*	*3.37*	*3.53*	*3.74*	*3.55*	*3.34*	*3.37*	*3.04*	*3.06*	*3.29*	*2.87*	*3.69*	*4.77*	*7.84*	*6.24*	*5.78*	*7.24*	*4.58*	*4.20*	*4.92*	*4.75*



Fluctuations in Carload Prices of Copper, Lead, Tin and



opper, Lead, Tin and Spelter in New York, and Tin Plate and Black and



and Galvanized Sheets in Pittsburgh

New Capacity in Iron and Steel Plants

Additions to Open-Hearth Capacity Last Year 375,000 Gross Tons—Projected Capacity 525,000 Tons—One Blast Furnace Added in 1924, Four Projected—Electric Furnaces

IN actual pig iron and steel-making capacity completed and planned, last year made only a moderate showing. Undoubtedly the depression which hung over the industry most of the year was a deciding influence. The year just passed ranks fourth among the post-war years in new open-hearth capacity completed and parallels some recent years in actual additions to blast furnace capacity. New open-hearth capacity planned for 1925 is not heavy. It is not, however, insignificant, being larger than in 1924 or 1922. Records such as those made before or during the war are not easily approached.

One new blast furnace was blown in last year and four are projected, with the probability that three of these will be operating before 1926. Strikingly few have been the actual additions to blast furnace capacity, the total for 1921, 1922, 1923 and 1924 having been four—one in 1921, two in 1922, none in 1923 and one in 1924. The 1923 record was the leanest in 27 years. The maximum record was 14 furnaces completed in 1917 and 25 under way in 1916.

In new open-hearth or steel-making capacity completed in any year, the war years naturally hold the record. First ranks 1917 with 97 furnaces constructed, with an estimated capacity of 4,326,500 gross tons per year. In new capacity projected or under way the record was 72 furnaces in 1916, with an estimated capacity of 4,515,000 tons per year. For 1924 the estimate is 375,000 tons yearly capacity completed and 525,000 tons planned for completion in 1925.

New capacity, as represented by electric furnace installations, is included in this review, as it was a year ago. The information obtainable has been extremely meager.

Additions to Pig Iron, Steel and Rolling Mill Capacity

BASED on reports from blast furnace, steel and rolling companies, as well as some steel foundries, the following details have been formulated covering work completed in 1924 and plans under way or in prospect for 1925:

New Open-Hearth Capacity in 1924

Additions to open-hearth capacity last year were of small proportions. The total was only a little larger than the two poorest years since the war. The 1924 additions include only 7 furnaces, with an estimated capacity of 375,000 tons, or the same as was forecast one year ago. This compares with 19 furnaces added in 1922, having an estimated output of 875,000 tons. The 1924 record is close to that of 1922 and 1921, when only 8 furnaces each year were added, with 227,500 tons and 247,500 tons capacity respectively. The distribution last year was as follows:

New Open-Hearth Furnaces Completed in 1924

	No. of Furnaces	Annual Capacity Gross Tons
Independent companies	5	250,000
United States Steel Corporation	2	125,000
Total	7	375,000

The additions to open-hearth capacity in 1924 were made by the following companies:

Carnegie Steel Co., Edgar-Thompson works, two 100-ton furnaces; Inland Steel Co., Chicago, four 100-ton furnaces and Republic Iron & Steel Co., Youngstown, Ohio, one 70-ton furnace.

The additions since the war, according to compilations made each year by THE IRON AGE, have been as follows:

	No. of Furnaces	Annual Capacity Gross Tons
1919	9	625,000
1920	20	675,000
1921	8	247,500
1922	8	227,500
1923	19	875,000
1924	7	375,000

The record in furnace additions to capacity was 103 in 1916; the record in estimated capacity added was 4,326,500 tons for 97 furnaces in 1917, both war records.

Open-Hearth Construction for 1925

Nine (9) open-hearth furnaces for probable completion in 1925 are under way or projected. This compares with 7 in 1924, with 17 in 1923, with 6 in 1922, with 15 in 1921 and with 22 in 1920. The largest number ever scheduled for installation was 91 in 1916.

The estimated capacity for the 9 furnaces which will probably be completed this year is 525,000 tons. One of these is for a steel foundry. This compares with 375,000 tons for the 7 furnaces in 1924, with 819,000 tons for 17 furnaces in 1923 and with 217,500 for 6 furnaces in 1922—the smallest projected capacity on record. The largest contemplated additions to capacity during peace years was 3,100,000 tons for 88 furnaces in 1913.

New installations contemplated for 1925 include the following companies:

Tennessee Coal, Iron & Railroad Co., Fairfield works, four 100-ton furnaces; Ford Motor Co., River Rouge plant, Dearborn, Mich., four 100-ton furnaces and Commonwealth Steel Co., St. Louis, one 40-ton furnace.

Rebuilding or enlarging of furnaces by several companies, for both ingots and steel castings, was completed last year and planned for this year, but the expansion in capacity due to this is not a large item.

The new open-hearth capacity proposed for 1925, expressed in the form of a table, is as follows:

New Open-Hearth Furnaces Under Construction for 1925

	No. of Furnaces	Annual Capacity Gross Tons
Independent companies	5	275,000
United States Steel Corporation	4	250,000
Total	9	525,000

New Blast Furnace Construction

Only one blast furnace was completed and put in operation in 1924, paralleling the record in 1914 and 1921. In 1922 only two new furnaces were blown in. The furnace completed last year and blown in early last summer was the 400-ton stack of the Columbia Steel Corporation, Ironton, Utah. The estimated capacity of this furnace is about 150,000 tons of pig iron per year.

The record in new furnaces completed in any one year was 9 in 1912 and the record in those projected for completion in any one year was 25 in 1917. Additions to blast furnace capacity have been few in recent years. Three furnaces were actually built in the two years, 1921 and 1922. Only 5 were projected during the three years, 1921, 1922 and 1923.

The situation at the beginning of this year, cover-

ing blast furnaces completed last year and projected in 1925, is as follows:

Company	Completed in 1924	Under Construction or Projected
Columbia Steel Corporation, Ironton, Utah	1	..
Central Steel Co., Massillon, Ohio	..	1
Youngstown Sheet & Tube Co., Indiana Harbor (Ind.) plant	..	1
Mystic Iron Works, Everett, Mass.	..	1
Hamilton Furnace Co., Hamilton, Ohio	..	1
Totals	1	4

The estimated capacity of these 4 furnaces is about 660,000 tons of pig iron, basic and foundry, per year. The Indiana Harbor stack will be ready in February and work on the stacks at Everett, Mass., and Massillon, Ohio, is progressing rapidly. The Hamilton stack is partly completed, but is temporarily at a standstill.

Several companies rebuilt and enlarged their blast furnaces last year. This is particularly true of the United States Steel and the Bethlehem Steel corporations. The McKinney Steel Co. enlarged one of its furnaces from 400 to 600 tons capacity per day and expects to do the same to another stack this year. The Toledo Furnace Co., Toledo, Ohio, increased last year the capacity of its furnace from 550 to 700 tons per day capacity.

Details of the companies' reports of new construction completed or planned are as follows:

The Steel Corporation

New construction completed during 1924 and under way as of Jan. 1, 1925, by subsidiary manufacturing companies of United States Steel Corporation is as follows:

Carnegie Steel Co.

Completed

Edgar Thomson Works: Two additional furnaces at open-hearth plant No. 1; equipping finishing end of No. 1 rail mill for rolling and handling sheet bar.

Duquesne Works: Reconstruction of blast furnace No. 1 and stock yard; rebuilding four 75-ton furnaces at open-hearth plant No. 2; additions to pouring facilities, at open-hearth plant No. 1, including three 125-ton ladle cranes; and shipping building at 40-in. blooming mill.

Homestead Works: Two 125-ton electric overhead traveling cranes and rearranging equipment at north end of open-hearth plant No. 2 building; rebuilding and enlarging seven furnaces at open-hearth plant No. 4; eight 834-hp. boilers and auxiliary equipment at 140-in. plate mill and steam line to 48-in. plate mill; and electric motor drive for tables and shears at 48-in. universal plate mill.

Carrie Furnaces: Three 1100-hp. gas-fired boilers at blast furnaces Nos. 1, 2 and 5.

Lucy Furnaces: One pair blowing engines.

Isabella Furnaces: Ten-ton ore bridge and additions to ore stocking equipment.

Mingo Works: Boiler house and feed water purifying plant; and gas washer for blast furnace No. 2.

Bellaire Works: River dock for unloading pig iron.

New Castle Works: New boiler house for steel works, 7700-hp. boilers and coal storing and handling facilities.

Ohio Works: 3000-kw. electric generator and gas engine; equipping eight open-hearth furnaces to burn tar as fuel.

Farrell Works: Rebuilding three furnaces at open-hearth plant and equipping open-hearth furnaces to burn tar as fuel.

Clairton Steel Works: New roll and pinion stands, manipulator and shear gage for 40-in. blooming mill.

Clairton By-Product Coke Works: 366 additional by-product coke ovens, with facilities for tar and ammonium sulphate recovery, benzol plant and gas booster station.

Under Way

Edgar Thomson Works: 1000-ton hot metal mixer for Bessemer metal in open-hearth plant No. 1; hot metal elevated railroad from blast furnaces to Bessemer and open-hearth departments; and new boiler house, 18,000-hp. boilers and auxiliary equipment.

Duquesne Works: Reconstruction of blast furnace No. 2 and stock yard; and new electric sub-station.

Homestead Works: Rebuilding and modernizing structural mills; modern mill tables and manipulator, with scale removing equipment, at 30-in. slabbing mill; and water treating equipment for purifying plants at 84-in. and 128-in. mills.

Carrie Furnaces: Second 15,000-kw. generator station with boilers and auxiliaries; six turbo blowers with equipment at blast furnaces Nos. 1 to 5; modernizing and increasing ore stocking and charging facilities at blast furnaces Nos. 1 to 7; and car dumper and electric ore transfer system.

Mingo Works: Coke unloading dock, including a.c. electric power station.

New Castle Works: New central blast furnace gas-fired boiler plant, including building and 7200-hp. boilers.

Ohio Works: Rebuilding blast furnace No. 1; slag crushing plant.

Farrell Works: Rebuilding three additional furnaces at open-hearth plant.

Clairton Steel Works: New boiler plants for steel works and blast furnaces, including boiler feed water purifying plant.

Illinois Steel Co.

Completed

South Works: Remodeling blast furnace No. 5; improvements to slabbing mill and main slabbing mill engine.

Joliet Works: Remodeling boiler house and modernizing boiler equipment at rod mills.

Milwaukee Works: Mechanical stokers and coal and ash handling equipment for boilers at merchant mills.

Gary Works: Stokers for boilers at coke plant and additions to coal mixer at coke plant.

Under Way

South Works: Additional gas engine driven electric unit in No. 1 power station; and improving gas washing equipment at blast furnaces Nos. 5 to 8.

Joliet Works: Equipment to increase producing capacity of Bessemer slabs.

Gary Works: 140 additional by-product coke ovens; steam turbo electric generating plant, including buildings, two 15,000-kw. generators and eight 1200-hp. boilers; additional wheel finishing equipment and modernizing ore and coke bins and ore handling equipment at blast furnaces, Nos. 5, 6, 11 and 12.

Minnesota Steel Co.

Completed

Duluth Works: Remodeling blast furnace No. 1; two additional gas washers and enlarging washer building; fabricating plant for arrow fence posts.

Under Way

Remodeling blast furnace No. 2.

Lorain Steel Co.

Completed

Johnstown Works: 3-ton Heroult electric furnace in open-hearth building and flask yard including 20-ton electric overhead traveling crane.

Under Way

New machine shop building and additional machine equipment.

National Tube Co.

Completed

Lorain Works: New boiler house building, six 1500-hp. boilers and auxiliary facilities; 1000-kw. motor generator set at blast furnace blowing engine house; additional blast furnace gas engine with 3300-kw. alternator and improvements to blast furnace and four stoves at blast furnace No. 3 and one stove at blast furnace No. 4.

National Works: Larry car system at blast furnace No. 1.

Pittsburgh Works: Gas producer house with 10 mechanical producers and complete equipment at Pennsylvania department; coupling finishing equipment for manufacture of taper tapped couplings at Pennsylvania department; coupling finishing facilities at Republic department and four automatic coupling machines at Republic department.

Riverside Works: Slag pits and steam shovel for disposal of blast furnace slag.

Ellwood Works: Extension to main building, additional finishing machinery and relocating equipment in No. 1 hot mill and equipment for producing bored blanks for seamless couplings.

Under Way

Gary Works: Two continuous skelp mills and one universal skelp mill; pipe mills, consisting of five butt weld mills, four lap weld mills and one seamless mill with auxiliary departments and shops.

Lorain Works: Improvements to blast furnace No. 2 and new 10-ton ore bridge.

National Works: Rebuilding blast furnace and four stoves at blast furnace No. 1; gas washers for stove gas at blast furnaces Nos. 1 and 2; five hot blast stoves at blast furnaces Nos. 3 and 4; additions to machinery at No. 4 lap weld furnace.

Riverside Works: Improvements to blast furnace No. 2 and new drums for boilers in blast furnace No. 2 and pump station boiler houses.

Christy Park Works: 500-hp. boiler and auxiliary facilities.

Ellwood Works: Sub-station with equipment for additional hydraulic, compressed air and electric power; building and equipment for producing 1¼-in. to 2-in. seamless blanks.

American Steel & Wire Co.

Completed

Cuyahoga Works: 3-bay extension to cold rolling building and 5-ton electric traveling crane; improvements to six 658-hp. boilers at steam power plant; 12 cold rolling machines.

Newburgh Steel Works: Rebuilding No. 3 pit furnace at No. 1 blooming mill and additions to No. 1 blooming mill equipment.

Newburgh Wire Works: Modernizing and increasing capacity of pot annealing department.

Central Furnaces and Docks: Rebuilding blast furnace "A."

Salem Works: New boiler house, four 225-hp. boilers and auxiliary equipment.

De Kalb Works: Extending nail mill building and installing nail galvanizing department.

Anderson Works: New boiler house, four 800-hp. boilers and auxiliary facilities.

Scott Street Works: Modernizing four wire drawing frames and improving engine drive in wire mill.

Worcester, South Works: Two wire drawing frames; single reheating furnace in No. 2 billet mill; additions to annealing equipment at Central Works.

Under Way

Newburgh Steel Works: Water filter plant.

Central Furnaces and Docks: Gas washer for blast furnace "A" and improvements to blast furnace "C."

American Works: Remodeling cleaning equipment for rods and wire.

Worcester, North Works: 20 heavier-type cold rolling machines for conduit wire.

Donora Wire Works: Improvements in No. 3 rod mill.

At various works mechanical handling equipment for wire drawing is being installed.

American Sheet & Tin Plate Co.

Completed

Gary Works: Scrap bundling press at tin mill.

American Works: Extension to boiler house and new 693-hp. boiler.

Cambridge Works: Modernizing hot mill furnaces and mechanical stokers for eight furnaces and bar storage building and equipment and relocating annealing furnace.

Guernsey Works: New pickling and galvanizing building and modern pickling equipment; extending annealing building and installing continuous open annealing furnace.

New Castle Works: Coal crushing plant and handling equipment.

Shenango Works: 1500-kw. turbo generator and condenser in power house and 18 brick stacks over tin pots and rearranging tin house equipment.

Pennsylvania Works: Additions to power house building and 300-kw. generator.

Scottdale Works: 28-in. motor-driven bar shear with approach table and piler.

Vandergrift works: Extending scrap drop runway and installing 10-ton crane; 72-in. motor-driven bar shear.

Farrell Works: Rebuilding 10 hot mill furnaces and equipping with mechanical stokers.

Mercer Works: Four additional sheet mills and extension to pickling department; new bar storage building.

Improvements in the coke tinning equipment were completed at Gary tin, American, Crescent, Laughlin, La Belle, New Castle, Shenango, Pittsburgh, Pennsylvania, National and Farrell works.

Under Way

Cambridge Works: Extending power house and installing 200-kw. generator.

New Philadelphia Works: Resetting four boilers and equipping with stokers, superheaters and coal and ash handling equipment and new power house and 300-kw. engine-driven generator.

Wellsville Works: New annealing building and seven double annealing furnaces.

New Castle Works: Rebuilding hot mill furnaces Nos. 5 to 8 and mechanical doublers, with shears, for mills Nos. 5 to 20.

Shenango Works: Mechanical doublers and shears for 30 hot mills.

National Works: 72-in. motor-driven bar shear with approach table and piler.

Farrell Works: Mechanical doublers and shears for 20 hot mills.

American Bridge Co.

Completed

Ambridge Works: Rebuilding annealing furnace and 6 motor-driven radial drills.

Under Way

Pencoyd Works: Three 1000-hp. boilers in No. 3 boiler house.

Tennessee Coal, Iron & Railroad Co.

Completed

Ensley Works: Five 779-hp. boilers for No. 1 steam plant; turbo-blower, condenser and cooling tower for additional blowing capacity at blast furnaces and additions to billet yard crane runway.

Fairfield Works: Steel foundry; enlargement of finishing end of structural mill.

Under Way

Ensley Works: Two 834-hp. boilers at No. 1 steam plant; additional dolomite kiln; rebuilding rail mill table "B"; five rail ending machines for finishing mill.

Fairfield Works: Four open-hearth furnaces; sheet and jobbing mill and auxiliary facilities; 21-in. continuous bar and sheet mill; rail fastening department; 11-in. merchant mill warehouse and coke wharves and screening station for batteries Nos. 1 to 4 at by-product coke plant.

Bethlehem Steel Corporation

The subsidiary companies of Bethlehem Steel Corporation report the following improvements and additions completed in 1924 and under way at the close of the year at their various plants.

Bethlehem Plant, Bethlehem, Pa.

Completed in 1924: Cupola charging equipment at ingot mold foundry; angle bending machine, two crane runways, punch, and spacing table for fabricating shop; gag press and tables for 42-in. Bethlehem special structural mills; roof over storage bins at No. 1 open-hearth; coal transfer car, partition in coal storage bin and two rotary converters at coke ovens.

Under Way: One 6-cylinder Bethlehem oil engine for power house; additions to steel foundry consisting of leanto crane runways, sand storage, sand mixing equipment, shake out machine with elevators, two jarring machines, roll over machine, lengthening five core ovens, sand blast equipment, extension to the molding pit; heating furnaces and jib cranes for drop forge department; closing in end of crucible mill building; internal grinder for projectile shop; electric door hoists for furnaces in open-hearth No. 2; electrification of hot beds and hot saw at 48-in. Bethlehem special structural mill; three crane repair platforms at 42-in. Bethlehem special structural mill; electrification of hot beds and hot saw at 28-in. structural mills; electrification of cold saws at Bethlehem special structural mills yard; grading for tracks at coke ovens.

Steelton Plant, Steelton, Pa.

Completed in 1924: Coal mixing, crushing and screening equipment for coke ovens; additional facilities at fabricating shop; additional equipment at frog and switch shop; extension to shipping yard at rail mill; cinder ladle car and bowl for steel foundry; threading machine for car repair shop.

Under Way: Finishing equipment at rail mill; planers and grinder for frog and switch shop; new yard for gantry crane; new chemical laboratory building; sand blast equipment for steel foundry; improvement to coal crane at open-hearth gas producers.

Lebanon Plant, Lebanon and Reading, Pa.

Completed in 1924: Power circuit to concentrating department; enlarging blast furnaces "B" and "G"; brick wall at sintering plant; crane runway for wire drawing department; 10 bolt headers and handling equipment for cold bolt department.

Under Way: Installation of 16-in.-12-in. merchant bar mill; oil purifier for tapping and threading department.

Maryland Plant, Sparrow's Point, Md.

Completed in 1924: Drinking water cooling system at sheet and tin plate mills; 36-in. gas line from coke ovens to sheet and tin plate plant; air compressor for mechanical repair shop; water treating equipment, five new stoves, ladle house, coke breeze screening tower for blast furnaces; 30-in. gas main to coke oven by-product section; catch basin at coke ovens; six 130-ton ladles, office and tool room for open-hearth department; 18-in. edging mill for 24-in. billet mill; table and manipulator for 24-in. billet mill; extension to building at galvanizing department, equipment to roll roofing, grease pot for sheet mills; 19 six-roll tinning machines, mechanical doubler and shear for tin mills.

Under Way: Two toilet and locker rooms at coke ovens; two new stoves for blast furnaces; addition to roof of open-hearth building; two motor drives and gear reductions at rail mill; extension to crane runway at bar storage building for sheet mills; 12 additional hot mills with necessary furnaces, cold rolls, tin house and warehouse for tin mills;

rod and wire mill, including wire drawing and galvanizing departments, nail factory and barbed wire factory.

Lackawanna Plant, Lackawanna, N. Y.

Completed in 1924: Clock house at No. 3 gate; drinking water lines at coke ovens and scrap reclaiming department; equipping 8 boilers in boiler house No. 1 with improved gas combustion system; transmission line from No. 10 mill to electric repair shop; 114 (2 batteries) Koppers by-product coke ovens with necessary extension to coal handling, coke screening, by-product departments and auxiliary buildings; new scrap breaking and reclaiming department; two new stoves for blast furnace "D"; car winches for two furnaces at open-hearth No. 2; new mill, manipulator and electric drive for 40-in. blooming mill; motor generator set at No. 7 mill; additional crane runway at structural shipping yard; equipment for heat-treating bolts at spike, bolt and nut department; welfare buildings and facilities at blast furnaces and No. 1 fabricating shop; 300 dwellings for employees constructed by Bethlehem Land & Improvement Co.

Under Way: Equipment for measuring boiler output at power house No. 2; drinking water line to open-hearth department No. 2; 6600 volt transmission line to mills No. 1 and 7; transmission line to 48-in. plate mill; transformers and switching equipment for additional Niagara Power at substation No. 3; gas line for surplus coke oven gas to heating furnaces at Mills 1, 4, 5, 7, 9, 10 and spike, bolt and nut shop; gas lines from coke ovens to No. 1 open-hearth department; 3 roll lathes and grinder for roll shop; one 34-in. and one 60-in. roll lathe for rolls for new 18-in.-14-in. and 35-in.-28-in. mills; additions to coke screening station at coke ovens; 5 Bethlehem gas driven blowing engines for blast furnaces; 42-in. cold blast main from blowing engine house No. 2 to blast furnaces "F" and "G"; enlarging No. 5 furnace at No. 1 open-hearth department; improvements and additions to No. 1 open-hearth department consisting of new stockyard crane runway with tracks, approach trestle and stock platform, enlarging five furnaces and reinforcing crane runways and floor of building; 800-ton hydraulic slab shear, crop conveyor, slab and billet transfer, crane runway and crane for handling slabs and billets at 40-in. blooming mill; power feed and yard lighting for gantry crane at billet yard at No. 5 mill; additional facilities at structural shipping yard, consisting of 3 crane runways with cranes and service buildings; installation of apparatus to burn coke over gas in furnaces 1 and 2 at No. 2 mill; a complete 18-in.-14-in. structural mill with necessary buildings, cranes, mill equipment, drives, heating furnaces, gas lines, transmission lines, scale, etc.; a complete 35-in.-28-in. structural mill including buildings, cranes, mill equipment, heating furnaces, power lines, billet storage, etc.; installation of shear, tables and conveyors, for billets at No. 1 mill; motor driven centrifugal pump at No. 9 mill; new pinion housings, pinions, spindles and motor drive for 48-in. universal plate mill; electric slab pusher and electric door hoists on six heating furnaces at 48-in. universal plate mill.

Cambria Plant, Johnstown, Pa.

Completed in 1924: Additions and improvements to scrap reclaiming department, Franklin division; addition to transportation department office; machine tools and two double drum hoisting engines for mechanical repair shop; loading out conveyor and coal spillage elevator at Rosedale coke ovens; skip hoist for Rosedale coke ovens; retaining wall and electric converting station at ore yard, lower division; 100-ft. extension to ore yard, lower division; improvements and additions to blast furnaces "B", "D" and "G"; lavatory and locker room at open-hearth department, Franklin division; 34-in. reversing billet mill; shear crane for 34-in. billet mill; sheet bar stands at 18-in. mill, lower works; two axle lathes at axle mill; spool machine and equipment for barbed wire, five nail machines at wire mill; additions and extensions to steel car shop and axle and wheel finishing shops, Franklin division; three wheel turning mills and one contour grinder for wheel shop; motor drive for brick yard.

Under Way: Boiler house and four boilers with all auxiliaries, Franklin division: 15,000 kw. 6600 volts generating station including building, turbo-generator, boilers, condensers, crane, cooling tower, etc., Franklin division; coke screening and loading out systems at blast furnace "H", "J" and "K"; improvements and additions to stacks at blast furnaces "H", "J", "K" and "L"; complete rebuilding of blast furnace "E"; two cooling beds for 4-in. x 4-in. billets, 34-in. billet mill, Franklin division; new frog and switch and rail anchor departments at Gautier division; four motor driven bar mills (18-14, 18-13, 12 and 9 in.) at Gautier division including necessary buildings, mill equipment, cranes, shears, warehouses and shipping buildings, crane runway extension and crane and 2 furnaces at 24-in. mill, new pickling department, roll shop with roll lathes and grinders, offices and service buildings together with necessary sewers, water lines, power lines and substations, roadways and tracks; crane operated strippers in wire drawing department, and twisted wire hoop machine at wire mill.

Coatesville Plant, Coatesville, Pa.

Completed in 1924: Extension to skelp yard, motor drive for screw-down of No. 3 plate mill; installation of oil and tar burning system at open-hearth furnaces; motor drive for bar mill, Viaduct division.

Under Way: Motor drive and gear reduction at skelp mill.

Mining Properties

Bethlehem Chile Iron Mines Co., Chile: Completed in 1924: 14 three-room dwellings; addition to schools; main office, powder house and bath house; thirty-five 70-ton side dump cars; twenty-five 50-ton hopper bottom cars; one 300-ton electric shovel; three 60-ton electric locomotives.

Under Way: New theater, two bath houses, and addition to club houses, Tofo Mines; two 500 kw. generator sets; ½-ton electric furnace for repair foundry; third rail and trolley for mine tracks.

Cuba Division, Cuba: Completed in 1924: Acquisition of three chrome ore properties near south coast; railroad to main line of mine railroad from discharge end of aerial tramway from Caledonia chrome mine near north coast.

Youngstown Sheet & Tube Co.

The Youngstown Sheet & Tube Co., Youngstown, Ohio, completed last year at its various plants the following construction:

East Youngstown Works: The hearth of blast furnace No. 3 was enlarged from 16 ft. diam. to 18 ft. 6 in. diam. Four center combustion stoves were rebuilt with square checkers and the coke bins were lined with brick. A new office for the blast furnace superintendent and assistants was built. At the open-hearth department, a pneumatic handling system was installed to unload dolomite from cars.

At the merchant mills a new repeater for stands Nos. 9 and 10 and a 9 in. portable shear for cobbles was added to the 9-in. mill. A new roll shop was built, 32 ft. x 152 ft., including offices and tool rooms. New drives were put on all the galvanizing riggings and a heating and ventilating system was installed in the sheet mill galvanizing department. Four Nullmeyer wire drawing blocks were installed in the rod and wire mills and a turbine driven 35,000,000-gal. pump was installed in pump house No. 4.

In the tube mills, a No. 2 Abramsen straightening machine and inspection skids were installed, as well as an electro-galvanizing department for couplings. No. 6 lap weld mill was changed to a butt weld and an upset end tube plant was installed.

Hubbard Works: At blast furnaces Nos. 1 and 2 hot metal tracks were placed inside of the cast houses instead of outside, and a motor generator set was installed to take care of standby purchased power.

Brier Hill Works: A new stove, 23 ft. diam. x 105 ft. high, was built for blast furnace No. 2 and two other stoves were relined. The furnace was also relined and the hearth diameter increased from 17 ft. to 18 ft. 6 in. A 75-gal. pump was installed for the gas washer and coolers.

In the open-hearth department an additional crossover was installed from the charging floor to the charging track in front of the furnaces. At the 84 and 110-in. plate mill, a 200,000-gal. fuel oil tank was installed.

Eight sheet mills complete, with bar storage yard, were built, as well as full equipment for open and box annealing and all finishing machinery for making full finished sheets.

Western Reserve Works: One continuous pair furnace was built, which is stoker fired and has a capacity of 5 tons per hr.

Zanesville Works: A coupling storage building was constructed, 50 x 200 ft.

Indiana Harbor Works: Two new butt weld pipe mills were built with threading floor, galvanizing department and warehouses. Lap weld mill No. 1, for 8-in. to 20-in. pipes, was completely rebuilt and installed in a new building with an adjacent warehouse. Washer and locker rooms were built with capacity for 600 men and the storage yards for pipe were enlarged. Two gas boosters were installed in the coke plant and the ore yard and dock were extended.

South Chicago Works: Blast furnaces, Nos. 3 and 5, were completely relined and copper cooling plates were installed above the mantle. One stove was relined at blast furnace No. 3 and two at blast No. 5.

New construction now under way for completion probably in 1925 at the various plants is as follows:

East Youngstown Works: Reconstruction of all sheet and pair furnaces and a turbo blower for No. 4 blast furnace are in progress. A scrap hoist is being added at

the Bessemer plant and new cooling beds for the billet mill. A new Morgan continuous skelp and bar mill is in prospect.

Indiana Harbor Works: The new blast furnace is expected to be completed about Feb. 1 this year. The bulkhead to inclose submerged land is under way.

Mayville Iron Co.: Remodeling top of furnace A and relining one stove.

Evanston Works: Modernizing union and hardware departments.

Midvale Co.

The Midvale Co., Nicetown, Philadelphia, last year made certain changes and improvements, mainly along economic lines, with a view to increasing efficiency and reducing costs. The important ones were as follows:

In the open-hearth department, No. 8 furnace was equipped with Blaw-Knox reversing valves.

In the forging department, 12 heating furnaces at Nos. 1, 2 and 6 presses were altered for use of powdered coal. A 600-hp. waste-heat boiler was installed at No. 1 press heating furnaces and a 550-hp. waste-heat boiler at No. 2 press heating furnaces. An oil-fired annealing furnace, 11 ft. wide x 9 ft. 5 in. high and 60 ft. long, was built.

In the tire department No. 2 tire mill was altered to expedite changing of rolls and No. 10 press was equipped with a new manipulator and a third jib crane.

In the machine shop, a 76-in. Newton cold saw was installed in No. 1 shop and a portion of this shop was fitted with inspection and skidding floor and a number of tools were rearranged for the more economical machining of medium sized pieces. A new machine shop was built for the machining and grinding of hardened steel rolls.

In general, steam blowers for furnaces were replaced by electric driven fans and the system for the storage and reuse of used water was greatly enlarged and extended.

Ford Motor Co.

The Ford Motor Co., at its River Rouge plant, Dearborn, Mich., will put in four 100-ton open-hearth furnaces at its steel plant and in its rolling mill, which is now under construction, one 42-32 blooming mill and one 14-in. merchant mill. Completion of this program is expected this year.

When the furnaces and mills are completed, it is expected that the amount of finished steel turned out per month will be between 15,000 and 20,000 tons.

United Alloy Steel Corporation

The United Alloy Steel Corporation, Canton, Ohio, last year rearranged some of its rolling mill equipment with the view of economy and increased production. At its South works its 32-in. sheet bar mill was combined with its 18-in. mill and at its A plant its Lamberton and 20-in. mill were combined and four 2-high stands of 20-in. rolls were added and another heating furnace built. At its B plant four soaking pits and 4-hole preheating pits were built. A new stripper building was erected and equipped with a 20-ton crane. At the furnace division a new power house equipped with four 768 hp. boilers and a coal handling plant were built. The capacity of the blast furnace was increased 75 tons per day by enlarging the hearth. A sintering plant is now being built.

Colonial Steel Co.

The Colonial Steel Co., Pittsburgh, has about completed and expects to have in operation at the close of 1924 a new gas producer plant to supply gas for the open-hearth department and all rolling mills. It consists of five Wellman-Seaver-Morgan automatic producers with a capacity for gasifying in each producer 3000 lb. of coal per hr. and a storage capacity of 90 tons for each producer. It is equipped with an electrically operated conveyor system for handling coal and ashes.

The company also expected to have completed by the end of last year a brick and tile fireproof laboratory, completely equipped for chemical and metallurgical work, as well as research, and for investigation into heat treatment, metallography, physical testing, etc.

For completion early this year the company is now installing a 3-ton Heroult electric furnace for melting high-speed and carbon steel ingots. The ingot capacity will approximately be 3600 tons per year.

There is also being installed, for early completion, two electrically driven pumps for the general water supply of the company's plant at Monaca, replacing steam pumps.

Wheeling Steel Corporation

The Wheeling Steel Corporation, Wheeling, W. Va., has completed or has under way the following improvements at its various plants:

La Belle Works, Wheeling: During 1924, 12 tack machines and a nail hardening furnace for hardening nails for hard wood floors was installed, as well as a new 22 in. plate mill to replace an obsolete unit.

Martins Ferry Plant: Three 500-hp. Wickes boilers were installed during 1924 at the blast furnace, replacing three 350-hp. boilers which were obsolete.

Steubenville Plant: A new 35-in. Mackintosh-Hemphill blooming mill, driven by a 4-cylinder 36 x 60 Nordberg uniflow reversing engine, was completed and put in operation during 1924. There was also built one new 19-in. continuous Morgan sheet bar mill, consisting of eight horizontal stands with three stands of Edgers driven by 13,000 hp., 75 r.p.m. 4-cylinder 36 x 60 Nordberg uniflow engines. Five 829 hp. Connelly boilers, fired with powdered coal or blast furnace gas or both, were also installed, as well as six new Wood gas producers guaranteed to gasify 55 tons of coal each 24 hr. A new sintering plant, with a capacity of 133 tons per day has been constructed and the crane runways and charging floor platforms in the open-hearth department were rebuilt.

Beech Bottom Plant: Normalizing furnace for high finished sheets has been installed.

Portmouth Works: The 500-ton blast furnace has been relined and four new sheet mills for high finished sheets have been installed driven by Duplex, 28 x 42 Nordberg uniflow engines.

Republic Iron & Steel Co.

The Republic Iron & Steel Co., Youngstown, Ohio, at its Bessemer plant completed an 800-ton hot metal mixer and replaced part of its Bessemer mill equipment with a Morgan continuous 22½-in. and 19-in. billet, bar and skelp mill. At the open-hearth plant it completed and put into operation No. 15 open-hearth furnace at 70 tons capacity.

At the by-product coke works there was completed during 1923 No. 3 battery consisting of 61 Koppers Co. Becker type ovens, together with the necessary equipment for recovering by-products.

At the tube works department the company expects to complete early in 1925 No. 4 butt weld mill.

John A. Roebling's Sons Co.

The John A. Roebling's Sons Co., Trenton, N. J., at its Trenton plant completed last year its cold rolling mill No. 3, 138 ft. x 300 ft., having two stories and being completely equipped. A sub-station of 5000 kva. for purchased power was added and the replacement of all engines with motor drives was carried through. Wire rope and stranding machinery was added, as well as a continuous annealing furnace.

At the Kinkora Works, Roebling, N. J., a 3600-kva. sub-station, with an extension to the power house, including the installation of two 1000-kva. motor generator sets, was completed. A 1500-hp. direct current motor was being installed in rod mill No. 1 to increase production. Electric power has been substituted for engines in the wire cloth department. A carpenter shop for the construction and repair department and additional dryers for the cleaning houses were completed last year.

Gulf States Steel Co.

The Gulf States Steel Co., Birmingham, Ala., has now under construction a 500,000-cu. ft. gas holder. It installed during last year a 125-ton Pugh type hot metal mixer and a 2500-lb. steam hammer in its blacksmith shop. A four part wire annealing plant was also erected and the wire mill was equipped with a complete blower system to furnish employees with cool and pure air.

Central Iron & Steel Co.

The Central Iron & Steel Co., Harrisburg, Pa., changed last year its 72-in. plate mill to a jobbing mill

and equipped it with an annealing furnace, sheet leveler and squaring shears. The plant is producing blue annealed jobbing sheets. An additional product is now being manufactured in the form of "Central" diamond floor plates. A new stamping department consisting of pickling vats, furnaces, five presses and accessories has been placed in full operation, manufacturing blanks and pressed steel parts.

A central powdered coal plant under the Fuller-Lehigh system of pulverizing has been erected and powdered coal has been introduced on several types of heating furnaces.

Jones & Laughlin Steel Corporation

The principal major improvement of the Jones & Laughlin Steel Corporation, Pittsburgh, in 1924 was the installation of a 14-in. continuous mill at the Woodlawn, Pa., works. This mill has 10 stands of rolls, is electrically driven and will be completed and in operation at an early date. It will be used in the production of small shapes and flats. It is of the so-called automatic type and is capable of very high speed, each roll stand being driven by an individual motor.

Inland Steel Co.

The Inland Steel Co., Chicago, completed four 100-ton open-hearth furnaces during 1924 and completely rebuilt one blast furnace. With the additional open-hearth furnaces the company has approximately an ingot capacity of 1,500,000 tons per year.

Timken Roller Bearing Co.

The Timken Roller Bearing Co., Canton, Ohio, during 1924 added a 3-high 35-in. blooming mill and six soaking pits, erecting new buildings in which these units are housed, and made various minor improvements in its steel making department.

Mansfield Sheet & Tin Plate Co.

The Mansfield Sheet & Tin Plate Co., Mansfield, Ohio, last year enlarged its soaking pit building and added additional soaking pits, increasing the capacity of that department one-third. This company also installed complete new annealing equipment and increased the capacity of its pickling department one-third.

Ashtabula Sheet Steel Co.

The Ashtabula Sheet Steel Co., Ashtabula, Ohio, last year added a new finishing department, added new annealing equipment and installed a new pickling department. The main building was lengthened 100 ft. to provide space for the additional equipment. A new crane was also installed.

Apollo Steel Co.

The Apollo Steel Co., Apollo, Pa., made a great many changes and improvements in its sheet and pair furnaces and also made a number of changes in its galvanizing department. Both these improvements have increased the capacity of the plants.

For 1925 the company has in view the construction of its own electric power plant.

Wisconsin Steel Co.

The Wisconsin Steel Co., Chicago, in March, 1924, started its new open-hearth steel department, consisting of five 100-ton furnaces (included in 1923 capacity). The pig casting machine has been rebuilt and 20-ton iron ladles replaced with 65-ton ladles.

The company is now building a new 40-in. blooming mill, which should be completed some time during the present year.

Otis Steel Co.

The Otis Steel Co., Cleveland, completed its new steel plant at its Riverside works early in 1924. This includes four 100-ton open-hearth furnaces (included in 1923 capacity), a 40-in. blooming mill and a 24-in. sheet bar mill. This company will probably add to its open-hearth capacity by the erection of three or four additional 100-ton furnaces this year.

Trumbull Steel Co.

The Trumbull Steel Co., Warren, Ohio, has not settled definitely on plant extensions for this year, but may add additional open-hearth capacity and an expansion of its finishing capacity. Definite plans are at present immature, two or three being under consideration. Reports in the press are that five open-hearth furnaces are under consideration, bringing the total for the company to 12.

Thomas Sheet Steel Co.

The Thomas Sheet Steel Co., Niles, Ohio, last year installed an electric drive in its plant. The new equipment includes two 1200-hp. General Electric motors with Falk gears and flywheels and a motor generator set. New Costello pair and heating furnaces and a blue annealing furnace with cooling table were erected. New galvanizing machines were installed in the galvanizing department.

Other Steel Works Additions

The American Tube & Stamping Co., Bridgeport, Conn., has under construction, which it expects to complete about March 1, this year, a new continuous billet mill and a new high-speed strip mill, full details of which were described in an article of THE IRON AGE, August 28, 1924.

The Jessop Steel Co., Washington, Pa., completed last year additions to its forge shop, consisting of a 4-ton Chambersburg hammer, as well as additional rolling capacity in the shape of a 12-in. 5-stand mill, motor driven. The company's shipping facilities were also increased by about 10,000 sq. ft. and the annealing capacity by four additional annealing furnaces.

Pittsburgh Steel Co., Pittsburgh, expects to expand its finishing department with the idea of diversification. The new plant will call for a capacity of approximately 12,000 tons per month. Various new products are under consideration, but just what they will be has not been definitely decided.

The National Enameling & Stamping Co., Granite City, Ill., completed and put into operation in 1924, new boilers and two automatic tin pots.

The Ludlum Steel Co., Watervliet, N. Y., is planning the construction of a continuous furnace for its 10-in. mill.

New Rolling Mill Work

Additions to and improvements in the equipment of rolling mills, during last year or under contemplation, were as follows:

Kansas City Bolt & Nut Co.

The Kansas City Bolt & Nut Co., Kansas City, Mo., at its Sheffield steel mills completed during 1924 the reconstruction of its finishing mills by which rerolled rail steel was added to its products. There has already been started the construction of a sheet mill, of which one 84-in. 2-high jobbing mill, with continuous furnaces, is expected to be completed early this year. Additional mills will probably be added from time to time until the complete layout of eight mills is finished.

Acme Steel Goods Co.

The Acme Steel Goods Co., Chicago, completed and put in operation last year a fully equipped cold-rolled mill with capacity to produce and finish all widths up to and including 20 in., all gages, finishes, edges and tempers of cold-rolled strip steel. This mill has a rated capacity of 2500 ton per month and is now in operation. The company is planning to erect a new continuous hot-rolled mill with capacity and size from 4 in. wide to 16 in. wide of hot-rolled strip. The building foundations

are in and part of the building is already up. It will be electrically driven.

Clayton Mark & Co.

Clayton Mark & Co., Chicago, built during 1924 two butt weld pipe mills at West Seventy-fourth and Robey Streets, Chicago, which were put in operation early in December. These mills have a capacity of about 75,000 tons of butt weld pipe, black and galvanized. The company has also equipped a plant for the manufacture of drive well points and water well supplies, which were put in operation last year.

Other Rolling Mill Work

The Reading Iron Co., Reading, Pa., completed last year its new charcoal skelp department, which consists of 20 charcoal knobbling furnaces and a 24-in. bar mill for rolling charcoal blooms into bars. More complete details of this mill were given in this review a year ago, Jan. 3, 1924.

The Stanley Works, New Britain, Conn., installed last year a new cold rolling mill.

The Bryden-Neverslip Co., New Brunswick, N. J., last year completed the installation of new rolling mill equipment consisting of a steel mill building, two Chapman gas producers, two Swindell heating furnaces, a 20 in. 3-high, single stand, electrically driven rolling mill and a 10 in. 3-high, 6-stand, electrically driven rolling mill. The company also put into operation new equipment for the manufacture of forged, heat-treated drive calks for horseshoes.

The Fort Dodge Culvert & Steel Co., Fort Dodge, Iowa, added in 1924 to its present equipment a 16-in. train.

The Kelley Car & Foundry Co., Anniston, Ala., last year rearranged its plant entirely and installed a new steel building, 90 ft. wide by approximately 1000 ft. long, to be used as a rolling mill, a forge shop, a punch shop and an erection shop in the car building.

The Buffalo Steel Co., Tonawanda, N. Y., last year constructed a fabricating plant complete in every detail. The company states that it is now in a position to bend all kinds of reinforcing bars. The company's capacity is about 50,000 lb. per day of straight bars cut to length or bars bent according to blueprint and specifications.

The Norton Iron Works, Ashland, Ky., is erecting a fine wire factory and wire cloth plant, which is expected to be ready for operating early this year.

The Keystone Steel & Wire Co., Peoria, Ill., added additional equipment to its nail department, increasing the capacity approximately 500 tons per day.

The Central Tube Co., Pittsburgh, completed in 1924 a butt weld tube mill and has under construction for completion in 1925 one lap weld tube mill.

The Champion Spark Plug Co., Toledo, Ohio, began the erection late in the year of a building to be occupied by a cold drawn steel department. This will be equipped with a capacity for making 60 tons of cold drawn steel per day.

Blast Furnace Work

The Toledo Furnace Co., Toledo, Ohio, during 1924 tore down its B furnace, which is now being rebuilt and enlarged. New stoves are also being built. The new stack is 95 ft. in height and the diameter of the bosh is 24½ ft. Its daily capacity will be increased from 550 to 700 tons. A new ore bridge was erected. The company has under erection a new power plant that will be equipped with a 10,000 lb. turbo generator.

The Perry Iron Co., Erie, Pa., rebuilt its furnace last year and added 10 ft. to its height without changing its diameter. Its daily capacity was increased from 375 to 400 tons. A new skip hoist and new bins were erected. This company has announced its intention to build by-product coke ovens and expects to go ahead with this work in 1925.

The Central Furnace Co., Massillon, Ohio, organized by interests affiliated with the Central Steel Co., Massillon, and the Cleveland Cliffs Iron Co., Cleveland, placed contracts in December for building a 600-ton blast furnace to supply hot metal for the steel plant of the Central Steel Co. A power plant will also be built. While a by-product coke plant is included in the construction program, the building of this will be deferred.

The McKinney Steel Co., Cleveland, completed the rebuilding of its No. 1 River furnace last year, enlarging it to a 22 x 91 ft. stack and increasing its daily capacity from 400 to 600 tons. During the latter part of the year it began a similar rebuilding and enlargement of another stack, which will be completed during the summer.

The A. M. Byers Co., Pittsburgh, installed a new pig casting machine at its blast furnace and did away with the old slag granulating pit and installed pits for hard slag. The company has a capacity of approximately 156,000 tons per year of gray forge and foundry pig iron.

The Napier Iron Works, Nashville, Tenn., is contemplating considerable improvements and extensions during the present year, but is not ready yet to make public any details.

The St. Louis Coke & Iron Co., Granite City, Ill., which is now in the hands of receivers, has temporarily held up its plans for building a second blast furnace, and it is uncertain as to when the original plan will be carried out.

The Delaware River Steel Co., Chester, Pa., is developing its blast furnace plant by installing a skip hoist and bins and is also building a new dock and installing machinery for unloading ore boats.

The Hanna Furnace Co. built new trestles and bins and made some other improvements to its Cherry Valley furnace, Leetonia, Ohio, last year.

The Mystic Iron Works, Boston, has under construction a 400-ton blast furnace which, it is believed, will be completed and ready for operation some time in 1925. The furnace is located at Everett, Mass.

John A. Savage & Co., Duluth, Minn., state that a good deal of work pertaining to No. 2 furnace of the Hamilton Furnace Co., Hamilton, Ohio, has been completed, much of it coincident with the rebuilding of No. 1 furnace. The company is now constructing 45 Koppers ovens sufficient to supply coke for No. 1 furnace. Any further construction on No. 2 furnace will come with a second battery of coke ovens rebuilt.

Additions to Steel Foundries

The Union Steel Casting Co., Pittsburgh, last year erected a new 25-ton acid open-hearth furnace on the site of one of the old furnaces and also a new core room building on the same site of the old building, 280 ft. x 40 ft., of steel construction, including a new 5-ton crane. An oil-fired, car type, heat-treating furnace, 6 ft. x 8 ft. x 8 ft., was added to the battery of annealing furnaces. A duplicate rotary converter was added to the power plant so that, in the case of a breakdown, the spare unit can carry the load.

The Commonwealth Steel Co., St. Louis, is now completing the installation of a 40-ton open-hearth furnace and a 400-ft. extension to its foundry, making this 1875 ft. long. This is claimed to be the largest foundry building in the world. The completion of these additions was estimated to fix the capacity of the plant at 300 tons per day of finished open-hearth steel castings.

The American Manganese Steel Co., Chicago Heights, Ill., last year acquired an additional plant for making manganese steel castings at Denver, Colo., where two 1½-ton electric furnaces have been in operation for some time. New molding and core-making machines, new annealing ovens, power presses, etc., have been added to the equipment. The plant also includes a modern iron foundry. The company's plant at New Castle, Del., is being electrified. Last year, at its main plant at Chicago Heights, many additions to machining equipment were installed. A new manganese steel foundry is nearing completion at Los Angeles, Cal., where a new electric furnace and other equipment will produce about 100 tons per month of manganese steel castings. The building is of steel construction.

The Bettendorf Co., Bettendorf, Iowa, is adding a

new power plant, which will be equipped with two 2500-kw. Allis-Chalmers turbine regenerators, one 750-kw. Allis-Chalmers rotary converter and two 4400-ft. electric driven air compressors furnished by the Chicago Pneumatic Tool Co. Steam will be taken from waste-heat boilers.

The Dayton Steel Foundry Co., Dayton, Ohio, installed last year a sand-handling and sand-conditioning outfit, which is pointed to as a departure from that ordinarily found in steel foundries, because the company has gotten away from the old batch mixing idea to a continuous operation, which is accomplished by passing the old and new sand to a bar mill.

The Maynard Electric Steel Casting Co., Milwaukee, Wis., has a large program of extension under way. It is adding 200 ft. to the length of its plant, thus increasing the foundry floor space 50 per cent. Two overhead cranes and several molding machines, as well as other equipment to increase output, will be installed. While the furnace equipment will not at present be increased, the company has in mind the extension of its melting capacity about 100 per cent during 1925.

Additions to Electric Steel Furnace Capacity

FOR the first time since the electric steel industry became established, some 10 or 12 years ago, information in detail concerning expansion has been withheld. Only generalities are available. The industry has not come to a standstill. There has been considerable expansion in the year just past. It has, however, apparently been confined to three or four companies. So far as ascertainable, new furnaces installed or contracted for in 1924 were about 40. As to types, these were distributed about as follows:

Moore (or Pittsburgh)	24
Heroult	5
Swindell, Greene and others	11*
Total	40

*Estimated.

Details concerning these sales are not made public. The American Bridge Co. states that four furnaces were sold to foundries. It is known that one or two other companies, particularly Swindell Brothers, Pittsburgh, and the Greene Electric Furnace Co., Seattle, Wash., have made several sales.

Moore Furnace Passes 100 Mark

The feature of the 1924 record is the business done by the Pittsburgh Electric Furnace Corporation, Pittsburgh. During the past year it placed contracts for its 100th furnace in the United States and Canada. The company gives the following as its record of sales since 1917 inclusive:

1917	3	1921	14
1918	5	1922	17
1919	7	1923	21
1920	11	1924	24

Repeat orders were received last year from the American Manganese Steel Co., the General Motors Corporation and the William Cramp & Sons Ship & Engine Building Co. The first-named company recently placed a contract for three 3-ton Moore furnaces, bringing that company's total to 6. In addition, the Pittsburgh company has sold four furnaces in Europe, one in China, one in South America and one in Mexico.

The General Furnace Co., Philadelphia, formerly the Electric Furnace Construction Co., announces that early this year it will bring out an entirely new type of electric furnace for steel and iron.

Summary

The record of expansion, as presented by the annual reviews of THE IRON AGE for the last few years, or since the industry started, has been as follows, including estimated additions last year:

Period	New Furnaces	Period	New Furnaces
July, 1913, to Jan. 1, 1915	22	1919	36
1915	32	1920	33
1916	63	1921	32
1917	97	1922	18
1918	54	1923	33
		1924	40

The estimated expansion last year therefore was the largest since the war. The foregoing table calls for 460 furnaces on Jan. 1, 1925, in the United States as compared with 420 a year ago. It is known, however, that various older furnaces have been scrapped or discontinued. Allowing liberally for such and for certain installations not made public, it can be conservatively estimated that there are about 450 furnaces still in existence as capable of active operation.

The Heroult furnace still leads with the largest total, close to 175, with the Moore furnace second with over 100.

Simplification Greatly Benefits Industries

(*Concluded from page* 43)

"Present waste in industry represents a huge deduction from the goods and services we might all enjoy," said Secretary of Commerce Hoover, when he created the Division of Simplified Practice to cooperate with industry. In inaugurating this work as a Federal activity, he charged the division with a definite mission —to help any industry to make a careful analysis of its problems, to study variety and demand, to bring together the manufacturing, distributing and consuming groups, and, with the facts at hand, to adopt those measures which would bring about the desired eliminations. No industry is forced to accept the division's services. No attempt is made to be inquisitorial or to dictate. In other words, it is not a police or regulatory body interfering in business.

Simplification is already being applied to Government purchases with benefits to every taxpayer. Secretary Hoover was responsible in a large measure for the development of specifications for Federal purchases, under which the Government is able to buy, at better terms and lower costs, articles which do not have to be made as "specials." And later, with the approval of the Governors of the States, Secretary Hoover was able to bring together the purchasing agents of the States to take action along similar lines. The formulation of specifications for all Government purchases is an important matter to the manufacturing world, for Government purchases amount to something more than a billion dollars a year.

However, with these economies so apparent to the manufacturer, the distributor and the consumer, there is another important consideration as yet untouched—the benefits to the wage earner. Seasonal operation has brought large labor turnovers, limited production and a number of other attendant evils, not the least of which has been the unrest which has been a result of periodic or spasmodic employment. Here simplified practice offers a remedy, for, with the elimination of excess variety, it becomes possible to manufacture for stock purposes during otherwise dull periods, to continue operations of plants without the continual uncertainty or the threat of demands for unusual sizes or numbers. Mass production, which has made American industry what it is today, can be continued. Changes of machinery, with their consequent idleness of the operators, their interruptions, and their inevitable "rejects" or "seconds," can be limited to a minimum. And whether as consumer or worker, the wage earner's standard of living is maintained or improved, his job is more secure, and the benefit is passed on to the nation at large.

In This Issue

Expansion in iron and steel industry will continue at a fairly rapid rate during early months of 1925, but will be checked rather early in the year, well known economist predicts. —Page 33.

Will Ford erect proposed steel plant at St. Paul? Some believe that natural disadvantages of St. Paul as a steel-making center will cause abandonment of project.—Page 52.

British salvage German warships scuttled in Scapa Flow by using German-built floating drydock.—Page 26.

Restricted immigration and passing of Pittsburgh Plus helps machine tool industry, says Warner & Swasey head, predicting era of good business.—Page 30.

Pig iron output for year 23 per cent below 1923. 1924 production estimated 31 million tons.—Page 2.

Machinery exports up 10 per cent for year; iron and steel exports off 10 per cent.—Page 50.

Workers walk underground to positions in new Gary Tube Co. plant. Subways eliminate dangers of travel through open spaces.—Page 40.

Millions of dollars already saved makers and consumers by simplifying dimensions and sizes of metal products.—Page 43.

Nineteen twenty-four steel ingot output estimated 36,500,000 gross tons, 16 per cent under 1923.—Page 2.

Liquidation last year was not sufficiently complete to lay basis for long upswing, declares expert. Indications point to continued careful buying.—Page 32.

Made public for the first time, complete table of rolled steel capacity by plants, by products and by districts. Pittsburgh district has 24 per cent and Chicago 16 per cent.—Page 9.

Coal and iron reserves will last hundreds of years, but grades will decrease steadily and costs increase.—Page 25.

Commodity prices are stabilizing. High prices declining; low prices rising. Fluctuations in average price very narrow for past three years. With single exception, at all times between 40 per cent and 60 per cent of 1913 average.—Page 47.

Imports of rolled steel increasing. Total 158,000 tons for first 11 months of 1924 was 58 per cent above same period of 1923.—Page 50.

Nearly two-thirds of 1924 rolled steel output taken by railroads, building and construction work, automotive industry, and oil and mining developments.—Page 5.

New record in structural steel awards set in 1924. Estimated total 2,150,000 tons; 7.5 per cent above 1923.—Page 6.

Consumption equal to 95 per cent of structural steel-producing capacity. —Page 8.

Group of railroads saves $180,000,000 by reducing service stock items 45 per cent through simplification.—Page 43.

Can industrial output and prices increase for more than a few months without bringing over-production into evidence? Economist says no.—Page 31.

"Clink detector" warns of flaws in forgings.—Page 64.

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Great Britain Quiet for Holidays

Improved Business Anticipated for 1925—Tin Plate Market More Active—Labor Troubles Worry Belgium

(By Cable)

LONDON, ENGLAND, Dec. 29.

WHILE the markets are quiet over the holidays, traders are more confident of improved business for the coming year. Cleveland producers are sold heavily to domestic consumers for the first half year, but export buying is still poor. Hematite is quiet, with stocks still abundant.

Finished steel is dull and without change.

Clyde shipbuilding output for the current year was 419 vessels, aggregating 553,804 tons.

Continental markets are somewhat disturbed by possible labor troubles in Belgium. Already some orders have been canceled. Demand is practically stagnant.

Sheets and Tin Plate

Considerable improvement is noticeable in tin plate, particularly for Far Eastern consumers, and some good business has been done on basis schedule. Home consumers are moderately active. Richard Thomas & Co., Ltd., have reopened the Lydbrook and Lydney mills and general prospects are more hopeful.

Galvanized sheets are quiet. Makers are well sold, but merchant sellers are inclined to accept lower prices.

There is fair demand for black sheets to Far Eastern specifications but business is on only a meager scale.

British and Continental prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.70 per £1, as follows:

Durham coke, del'd	£1	5s.				$5.87		
Bilbao Rubio ore†	1	4				5.64		
Cleveland No. 1 fdy.	4	6				20.20		
Cleveland No. 3 fdy.	4	1½				19.15		
Cleveland No. 4 fdy.	4	0½				18.91		
Cleveland No. 4 forge	4	0				18.80		
Cleveland basic	4	0				18.80		
East Coast mixed	4	8½	to £4	9s.		20.79	to	$20.91
East Coast hematite	4	19	to 5	0		23.26	to	23.50
Ferromanganese	14	0	to 14	15		65.80	to	69.32
*Ferromanganese	14	0	to 14	15		65.80	to	69.32
Rails, 60 lb. and up	8	10	to 9	0		39.95	to	42.30
Billets	7	0	to 8	0		32.90	to	37.60
Sheet and tin plate bars, Welsh	8	7½				39.36		
Tin plates, base box	1	3½				5.52		
						C. per Lb.		
Ship plates	9	0	to 9	10		1.89	to	1.99
Boiler plates	13	0	to 13	10		2.73	to	2.83
Tees	9	2½	to 9	12½		1.91	to	2.02
Channels	8	7½	to 8	17½		1.76	to	1.86
Beams	8	2½	to 8	12½		1.70	to	1.81
Round bars, ¾ to 3 in.	9	7½	to 9	17½		1.97	to	2.07
Galv. sheets, 24 gage	17	0	to 17	10		3.57	to	3.67
Black sheets, 24 gage	12	10	to 12	15		2.62	to	2.67
Black sheets, Japanese specifications	15	5				3.20		
Steel hoops	10	15	and 12	10*		2.25 and		2.62*
Cold rolled steel strip, 20 gage	16	0				3.36		

*Export price.
†Ex-ship, Tees, nominal.

Continental Prices, All F. O. B. Channel Ports

Foundry pig iron: (a)								
Belgium	£3	13½s.	to £3	14s.		$17.27	to	$17.39
France	3	13½	to 3	14		17.27	to	17.39
Luxemburg	3	13½	to 3	14		17.27	to	17.39
Basic pig iron: (a)								
Belgium	3	12½	to 3	13		17.03	to	17.15
France	3	12½	to 3	13		17.03	to	17.15
Luxemburg	3	12½	to 3	13		17.03	to	17.15
Billets:								
Belgium	5	2½	to 5	5		24.08	to	24.67
France	5	2½	to 5	5		24.08	to	24.67
Merchant bars:						C. per Lb.		
Belgium	5	15				1.21		
Luxemburg	5	15				1.21		
France	5	15				1.21		
Joists (beams):								
Belgium	5	10				1.15		
Luxemburg	5	10				1.15		
France	5	10				1.15		
Angles:								
Belgium	5	17½	to 6	0		1.23	to	1.26
⅛-in. plates:								
Belgium	7	0				1.47		
Germany	7	0				1.47		
¼-in. ship plates:								
Luxemburg	7	0				1.47		
Belgium	7	0				1.47		

(a) Nominal.

FORD BUYS BELGIAN RAILS

Detroit, Toledo & Ironton Purchase Covers 10,500 Tons

DETROIT, Dec. 29.—The Detroit, Toledo & Ironton Railroad has purchased 10,500 tons of steel rails in Belgium. United States rails bought at Pittsburgh and delivered at Detroit cost $46.72 per gross ton. The rails bought in Belgium cost $36.75 per gross ton delivered at Detroit by all water freight and $40 by overland freight. Deducting from the latter figure the items of $3.50 per ton ocean freight, $2.24 per ton duty and $6.28 inland American freight, the cost of Belgian production is low.

To the suggestion that has been made that the Detroit, Toledo & Ironton should buy American rails, officials replied that American steel manufacturers should be willing to sell to American consumers at the same prices they charge to foreign consumers. The Detroit, Toledo & Ironton officials pointed out that American steel rails are being sold in the United States at $46.72, while they are being laid down in Japan at about $38. Reference on this latter point was made to a statement on page 1360 of THE IRON AGE for Nov. 20, 1924.

Market reports in THE IRON AGE coming from Antwerp have put rails nominally at 725 fr., f.o.b. Antwerp, per metric ton, or about $35.50 per gross ton at prevailing rate of charge.

Operations of Ohio Foundries

The Ohio State Foundrymen's Association reports that November operations of Ohio foundries indicate a slight decline from October. November figures stand at 62.8 per cent of normal or capacity, while October indicated a figure of 64.5 per cent. The total melting capacity of the foundries reporting is 25,753 tons, against which tonnage there was melted 16,209 tons. November, 1923, was at 70.3 per cent of normal.

Stocks on hand have increased considerably, November indicating 98 per cent; October was on the basis of 85 per cent and November, one year ago, 82 per cent. Stocks received have also increased to 60 per cent. October stood at 52 per cent and November, 1923, 48 per cent.

Arthur J. Tuscany, secretary-manager of the association, says: "The slight decrease in November operations can, unquestionably, be traced to a desire on the part of users of castings to keep their inventory as low as possible for the benefit of their figures at the close of the year. There is a continuance of the healthy spirit which has been in evidence for some weeks."

ESTABLISHED 1855

THE IRON AGE

EDITORS:
A. I. FINDLEY — WILLIAM W. MACON — GEORGE SMART
C. S. BAUR, *General Advertising Manager*

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The Prospect in Steel

IT is usual to write favorably of the business outlook for a new year. Men of leading in industry, finance, transportation and commercial life are the ones whose opinions are sought and given out, and they are bound to marshal the constructive factors. Those whom they lead must have no counsel of misgiving or of lions in the way. If there be any note of warning, it is generally sounded to notify some special interest that insistence on its program—some legislative measure, perhaps—is the one thing that might mar a picture otherwise full of promise.

There is more than ordinary unanimity about the business prospect for 1925. The country has been full of optimism in the eight weeks following the election. The Stock Exchange went promptly to work on an upward reappraisal of market values of securities and is now giving indications that the process of forecasting larger prosperity is not completed.

What Wall Street has done since Nov. 4 is to throw on the canvas in strong outline the larger and more profitable business that is looked for. It remains for manufacturers, farmers, bankers, workers in all lines to fill in the picture by the widening of their activities as they advance into 1925.

Thus far, as is well known, there has been no such improvement in business as has been seen in the prices of stocks. But there is no lack of evidence of the general belief that 1925 will see a forward movement—a belief based on a confidence that thus far at least has no aspects of overconfidence.

The sum of the argument is that if the United States could have such a year as 1923, with all that was working against prosperity—working both at home and abroad—how much greater a year must 1925 be, with the farmer in funds, with Germany started on the road to financial and industrial recovery, and with all the assurance the election gave that the vast majority of the American people stand with the President for economy and common sense, and will have none of a candidate who would shake government, shake business and divide the nation into hostile camps.

The steel industry already has given prophecy of greater activity in 1925. At the end of a 67 per cent year, steel mills have come up to an 80 per cent operation, in what is ordinarily a quiet month, and in the entire industry is an atmosphere quite different from that of the year it has left behind. Railroads, building, and the automobile, which last year took nearly 55 per cent of the steel output, promise a greater total in 1925, to which will be added all the streams of demand that have their sources in new agricultural buying power and in the improvement that has come in what for months were the backward industries—textiles, rubber, leather, copper and fertilizers.

With the chastening experiences of 1924 fresh in mind, and knowing how slender is the margin of profit on the business they have taken for the first quarter of the new year, steel producers are in no present danger of making haste too rapidly. Their customers in the metalworking industries, whose restocking orders have been a large factor in the steel market of the past month, see no evidence in their own businesses of a headlong expansion in the months just before them. Existing steel making capacity could take care of a very considerable increase in manufacturing-consumer demand before showing signs of strain. Railroad service, which has risen to its highest point of efficiency in the past year, promises in like manner to obviate the necessity of unusual accumulations of stocks in buyers' hands in the coming months. That should mean small likelihood of duplicate buying.

In common with leaders in other industries iron and steel manufacturers do not ignore the handicapping forces at work that still must be reckoned with, as was pointed out in comment on "The Economic Outlook" in THE IRON AGE of Dec. 11. They have found out also by long experience that their industry is peculiarly one in which it is the unexpected that happens. Yet with every

allowance on the side of conservatism, the outlook for larger activity and improved earnings is better today than the steel trade has seen at the beginning of any year since the war.

Sheets and Tin Plates Count Heavily

IT is a noteworthy thing that of all rolled iron and steel nearly one-eighth is made up of sheets 13 gage and lighter, not including black plate subsequently tinned. In point of tonnage one thinks of steel being chiefly in the heavier forms—rails, structural shapes, plates, etc.

From one viewpoint it is more remarkable still that the proportion of sheets to the total rolled tonnage has increased greatly in recent years. The rapid increase in the use of steel is naturally attributed to development of machinery for its use. One would not expect, for illustration, that the proportion of nails to total iron and steel would increase, for the nail is very old, and people have always been able to consume nails. Sheets, being easily worked, one would expect to have reached their full place long ago among iron and steel products.

Such, however, is not the case. Statistics of production separating 13 gage and lighter from heavier gages are available only from the year 1905. In that year the production of 13 gage and lighter, excluding black plate for tinning, was 983,437 gross tons, which was 5.8 per cent of the total of rolled iron and steel. In 1922 the high proportion of 11.3 per cent was reached, with 2,980,799 tons. Next year the production was 3,405,216 tons, but as other steel production increased greatly the proportion dropped to 10.2 per cent.

Production in the year just ended was below the record year, but 1924 belongs in the list of great sheet years, with an output of not far from 3,000,000 tons, or 11 per cent of the total rolled iron and steel, which may be estimated as in the neighborhood of 28,000,000 tons, of which 27,000,000 tons was steel.

The figures here cited do not appear directly in the official production statistics, where the tonnage follows the classification of mills, jobbing mills being included with sheet mills. For statistical comparisons indicating growth the 12 gage and heavier is best omitted, as it contains material cognate with light plates produced by plate mills and changing market conditions caused orders at one time to go to light plate mills and at other times to jobbing mills. The figures quoted above include sheets not tinned which are rolled on so-called "tin" mills, which are certainly sheets.

In the production of sheets, as has been said, 1923 was the record year by a wide margin. In tin plate 1923 came within a fraction of 1 per cent of meeting the record made in 1917. The production of tin and terne plate in 1923 was 1,506,862 tons, making with the sheet tonnage already cited a total of 4,912,000 tons of material 13 gage and lighter, or almost 15 per cent of the total rolled iron and steel.

In the past year production of tin plate fell off somewhat, on account of poor crops, and was between 5 and 10 per cent under that of 1923, but the proportion to total steel production increased slightly, as steel ingot output fell off about 16 per cent. The proportion of sheets and tin plates, excluding 12 gage and heavier, seems to have been about 16 per cent of the total rolled iron and steel in 1924, or almost one-sixth, a remarkable showing for such light material and indicating the ubiquity of the lines of ultimate consumption.

Working Back to Normal

JUST after the war the majority of men expected to be carried along by the post-war boom in industry that had been commonly predicted. Labor refused to "give up" anything it had "gained" during the war, thus being disposed to ignore any circumstances not to its liking. Sellers wanted to hold on to their high prices and soon tried even to increase them. In 1920 there was an effort on the part of dealers and others to make speculative profits by hoarding, the effort being more notable for its stubbornness than for its wisdom.

Then, in 1921, "return to normalcy" was preached. Since the suggestion was made by our late President we have all been watching for indications of this return. Steel is one index of something that has occurred in the past two years, with an average production of 40,000,000 tons of ingots a year, or one-fourth more than the 32,000,000-ton average of the four preceding years, the first four years of the post-war readjustment period which will never definitely end.

This increase in steel means that men have been working harder. They have been getting back to normal, for the normal includes work.

One year ago there was much talk about 1923 having been a good year in point of volume of business, but that it had something lacking, viz., adequate profits. At the end of 1924 the same thing may be said, but with more emphasis. Most observers would probably say that 1924 has been even less satisfactory than 1923 in the matter of profits. Does not this suggest that there is something out in the reckoning? The war produced a feeling in the mind of the individual that he was entitled to be taken care of, and while there is less looking to Washington than there was, there is much consulting of statistics and graphs, with the conscious or unconscious feeling that somehow economics are going to carry the individual along to greater prosperity.

It looks as if many business men have not got so far back toward normal as they might have, in conception of the effort requisite for the making of profits. The individual business man must make progress or he is unlikely to make profits. It is exceptional for any line of business to yield profits year by year if methods are not improved.

Employers, in watching employees for a return to normal, should not overlook the fact that an equal responsibility, if not a greater, rests upon them to return to normal in the matter of striving to make progress in buying, manufacturing and selling. The record of the last year indicates that

not a little is yet to be done, in the matter of a return to normal, in the attitude toward profits.

How Surtaxing Works

IN the discussion of income tax revision, which continues to be a live issue, there are current two fallacies in respect to matters that well may be elucidated. One of these is simple; the other is more obscure.

The simple matter is that of tax-exempt investments. The person who makes them is represented as evading his taxes. Of course, there is no evasion in the sense of reprehensibility inasmuch as such investment for a yield free of taxation is specifically legalized. There is, however, less misconception as to that than there is in the idea that a person making such investments escapes the consequences of taxation. Thus, Senator Couzens, who is trying to show that many corporations get away with paying less than they ought to, is jeered because his own great fortune is mainly invested in tax-exempts.

As a matter of fact the tax-exempt securities yield a very much lower rate of interest than ordinary industrials. With the wealthy investor it is purely a matter of computation whether he shall invest in industrials and pay a large tax out of his proceeds, or in tax-exempts from which he will get a lower yield but out of which he has to pay no tax. The income that is available for his own purposes is trimmed either way; and by the State, though by different methods. Moreover, the economic consequences are theoretically the same, but undoubtedly they are the less harmful when the taxes are paid to the Federal Government. Therefore, the surtaxing should be so reduced as to cause the money to go that way rather than into the hands of States and municipalities.

The fallacy that is less simple of clarification is that the taxes paid by the rich are passed on to the poor, so that in the end they are really paid by the latter. Even Secretary Mellon does not appear to be clear in his mind in respect to this. Taxes are not passed on unless the payer thereof acts merely as a collecting agent for the Government, as does the manager of amusements to which tickets of admission are more than 50 cents. The landlord who rents a house does not, however, fix a rate plus tax, but he asks a rental according to market conditions and out of it pays the tax that he must, his other costs to greater or less degree, and reckons the remainder as return on his principal. The rate thereof may be more or less than the average for such investments. So also with the producer of commodities, who may operate for a long time at a loss and yet be constrained to pay some taxes, especially on property, which manifestly he neither does, nor can, pass on to anybody.

Nevertheless the incidence of taxation does play a part in fixing the position of the marginal producer and by so doing has an effect upon everybody, although it may be considerably delayed in making itself felt. The more immediate effect of class taxation is in unbalancing the national economy and producing high prices, from which everybody suffers, by diverting labor from some employments to others and by curtailing labor.

Let us suppose, for example, that Henry Ford were relieved of surtaxes. Let us suppose, moreover, that the Federal Government were taking no more by taxation than is necessary. We must give the present administration unbounded credit for accomplishments in that direction. Obviously, then, the excusing of Mr. Ford would require other persons to pay more, but Mr. Ford would be in a position to apply greater resources to purposes of production, which would tend to cheapen prices. By virtue thereof Tom, Dick and Harry would be gainers even if they individually had to pay more in taxes. This means simply that the aggregate of what they had to pay would be more useful economically in the hands of Mr. Ford than in their own.

Similarly as to Senator Couzens. He invests in tax-exempt securities and thereby enables the States and municipalities to divert labor to the construction of highways, parks, public buildings, etc., all of which are desirable if they can be afforded. But if Senator Couzens were able to invest in industrial securities there would be put in motion economic forces tending toward the production of more houses, better railroad facilities and other things helping amelioration in the cost of living. Thus, also, would the public be better off if it refrained from exacting large taxes from Mr. Charles Chaplin, which he cannot reimpose upon anyone else, and allowed him to make larger industrial investments.

Reduced to the baldest terms the idea and fallacy of class taxation are these: Any community has certain expenses to defray. If out of 1000 men such expenses can be caused to fall on 10 rich men and let the other 990 go scot free the result is equivalent to an increase in income for them. Such is the hypothesis. The fallacy is in the failure to see that the concentration of the taxation on the 10 rich men causes the expenses of all the others to rise, and in all probability to rise by more than what they save by escape from taxation.

Engineering Foundation to Be Represented in Many Cities

The appointment of 190 engineers in 27 cities as local representatives of the Engineering Foundation, 29 West Thirty-ninth Street, New York, has been announced by Charles F. Rand, chairman of the Foundation. These engineers, representing industry, education, and the public service, will, it was stated, work with the Foundation board in a plan of research "for the furtherance of research in science and in engineering, or for the advancement in any other manner of the profession of engineering and the good of mankind."

The Foundation's work will be carried on with the $500,000 endowment provided by Ambrose Swasey, Cleveland, reinforced by a recent bequest of $50,000 from the estate of Henry R. Towne.

American ships carried 35.88 per cent of American water-borne foreign commerce in the first ten mnoths of 1924, compared with 34.49 per cent in the ten months last year. But foreign vessels carried $3,691,000,000 to the $2,066,000,000 in American bottoms.

PERSONAL

G. Vintschger, head of the Markt & Hammacher Co., New York, manufacturers' export and import agent, has announced his plans to retire from active business. He retains the position of honorary chairman of the board, leaving the control of the company to his son, Edward Vintschger. The elder Mr. Vintschger, now on the threshold of 80, was educated in Milwaukee. In 1868 he came to New York, where he soon established the import and export firm of Markt & Co., one of the first houses to introduce American made hardware and tools into Europe. Later its business was extended to all parts of the globe. Opening first in Germany, the company later established offices in London, Paris and St. Petersburg. In 1902 Mr. Vintschger made a trip around the world, laying the foundation for an extensive trade with the Far East. During the war large quantities of Army supplies were distributed from the company's Paris branch out of American stock and a great many tools were supplied to the U. S. Army.

G. VINTSCHGER

F. W. Fry, formerly with Emanuel Dreifus & Co., Inc., and recently with the S. Snyder Corporation, has associated himself with the New York office of the E. B. Leaf Co., 152 West Forty-second Street, New York.

Henry W. Darling, for more than 30 years treasurer of the General Electric Co., has resigned and on Jan. 1 will be succeeded by R. S. Murray, who has been assistant treasurer since 1910. In accepting his resignation the board of directors elected Mr. Darling a vice-president with such duties as shall be assigned to him by the president. Mr. Darling has been intimately associated with the financial affairs of the company since its organization in 1892, and Mr. Murray since 1893.

H. E. Cook, formerly assistant superintendent of the Portsmouth By-Product Coke Co., Columbus, Ohio, at Portsmouth, Ohio, has been promoted to superintendent, succeeding L. D. Huestis, now general manager. Mr. Huestis was also elected to the board of directors.

Hans Thyssen, nephew of August Thyssen, a German steel master, sailed Dec. 27 for Hamburg, after spending seven weeks in the United States. He visited steel plants in Pennsylvania and passed some time in Chicago.

C. B. Starr has joined the Robert June engineering management organization, 8835 Linwood Avenue, Detroit. He graduated from Cornell University with the degree M. E. and was assistant mechanical engineer with the Duff Mfg. Co. of Pittsburgh, later serving as sales engineer with the Detroit office of the Wayne Tank & Pump Co.

William P. Cheney, for the past 23 years identified with Rogers, Brown & Co., most of that time in the company's Pittsburgh office, has resigned. Mr. Cheney started with the company in its Boston office and a few years later was transferred to Pittsburgh, becoming joint manager of the office with Thomas A. Wilson about 10 years. For the past four years Mr. Cheney has been manager of the coke department of the Pittsburgh office. He will make his home in Boston. His future business plans are indefinite.

James J. Shanahan, general manager E. L. Essley Machinery Co., Chicago, and for 13 years associated with the firm, has resigned, effective Dec. 31.

J. W. Rupert has been appointed works manager for the A. C. Spark Plug Co. in Flint, Mich.

S. A. Reese of Evansville, Ind., is the new president of the Southern Association of Stove Manufacturers. B. H. Hartsfield, Birmingham, becomes vice-president; W. H. Cloud, Louisville, Ky., secretary, and A. P. Selman, Rome, Ga., treasurer. The next convention will be held in Jacksonville, Fla.

Brass Manufacturers Hold Annual Meeting

The National Association of Brass Manufacturers held its annual meeting at the Hotel Astor, New York, on Dec. 11, at which nearly the full membership attended. A standing committee of five on research work was appointed, the purpose of which will be to prepare surveys, to investigate and uncover the most modern method of foundry practice and to look well into the matter of equipment for the most practical and efficient production. Under a new provision in the constitution applying to associate members, eight new firms were elected.

The association went on record as strongly opposed to the twentieth amendment to the United States Constitution, which pertains to child labor. Richard F. Grant, president of the United States Chamber of Commerce, was the principal speaker of the day. His address outlined the advantages of cooperation, and featured the accomplishments that may be obtained through unified action, citing among other things what has been accomplished in this way through the Chamber of Commerce of the United States.

Officers were elected as follows: H. F. Albers, Ohio, president; R. L. Ottke, Pennsylvania, first vice-president; H. C. Bulkley, Illinois, second vice-president; and C. J. Hill, D. M. Hamilton, Michigan, L. D. Lawnin, Missouri, Joseph Arth, Jr., Ohio, George Van Eweyk, Jr., Wisconsin, H. E. Harper, Wisconsin, were elected to the board of trustees. The meeting adjourned to meet in the Chamber of Commerce Building, Washington, on March 11 and 12, 1925.

Open-Hearth Furnaces for Carnegie Mingo, Ohio, Works

PITTSBURGH, Dec. 29.—The Carnegie Steel Co. will begin construction shortly on seven open-hearth furnaces at its Mingo, Ohio, works. This plant, which supplies sheet or tin bars to a number of the plants of the American Sheet & Tin Plate Co. in Wheeling and the Ohio Valley, has been exclusively a Bessemer steel plant. There is no official word as to whether the addition of the open-hearth furnaces means the ultimate expansion of the works to include finishing mill, or a replacement of Bessemer bars by open-hearth steel for both sheets and tin plate.

The Continental Gin Co., Birmingham, Ala., has placed a contract with the H. K. Ferguson Co., Cleveland, for additional plant units that will provide 225,000 sq. ft. of floor space. These will include a woodworking plant, 150 x 300 ft., assembly building, 150 x 400 ft., a paint shop, warehouse and boiler house. The latter will require three 150-hp. boilers. Some woodworking equipment will be required.

Directors of the Rochester Gas & Electric Corporation, Rochester, N. Y., have voted an expenditure of $1,000,000, the first cost of a modern central steam heating plant to be erected at Lawn and James Streets. It was stated by an official of the company that it plans to erect a second such plant at some future time on its property at Graves and Aqueduct Streets.

Iron and Steel Markets

FOR LARGER ACTIVITY

Markets Firmer and Mill Operations Tend to Increase

Ford Order for 10,500 Tons of Belgian Rails

The outlook for larger activity and improved earnings is better today than the steel trade has seen at the beginning of any year since the war. After the minor suspensions of the holidays, some mills enter 1925 with preparations for even fuller operation than in December.

At the moment the requirements of buyers and the first quarter bookings of the mills seem to be fairly in balance, so that further orders for that period would add to the firmer position of prices.

At Pittsburgh the leading plate producer has advanced plates from 1.90c. to 2c. in the week and in semi-finished steel the asking prices of some mills are $5 a ton above those of early November.

Pittsburgh mills are not yet so well booked as those at Chicago and are still absorbing freight to get business in intermediate territory.

A new rail order is that of the Chicago & North Western for 41,000 tons—35,000 tons to the Steel Corporation and 6000 tons to Bethlehem. Of 3000 cars placed, the L. & N., Missouri Pacific and Northern Pacific take 1000 each.

Chicago mills in 1924 booked 500,000 tons of plates, shapes and bars and axles to the number of 250,000 for the 62,575 freight cars placed in that district. For the whole country the new cars ordered last year were about 138,000, as against 98,000 ordered in 1923.

It is now definitely stated that the Detroit, Toledo & Ironton Railroad's purchase of Belgian rails was 10,500 tons and the price $36.75 at Detroit, by all water route, or $40, reckoning overland freight from seaboard. At $3.50 ocean freight, $2.24 duty and $6.28 inland freight, the $40 price figures back to $27.98 Antwerp. Pittsburgh rails are $46.72 at Detroit. For some weeks Belgian rails have been quoted nominally at the equivalent of $35.50, Antwerp.

New interest is being taken in line pipe contracts, since oil companies believe they can buy to better advantage now than later. The Humble Pipe Line Co. is projecting a line from Comyn, Tex., to Reagan County, calling for 200 miles of 8-in. pipe, and the Houston Oil Co. has plans for a gas line. The Hope Natural Gas Co.'s order for 100 miles of 20-in. pipe goes to Youngstown.

Chicago still leads in advancing pig iron prices, adding another 50c. this week, with buying heavier than had been expected. St. Louis reports sales of 30,000 tons of basic in the past two weeks. In other districts buying has been limited, but prices are firm. It now appears that the Connellsville wage advance will add $1 a ton to the contract price of coke for the first quarter.

We estimate the December pig iron output at 2,800,000 tons, or above 90,000 tons a day, as against an average of 83,656 tons a day in November. The 1924 output, including charcoal iron, was not far from 31,100,000 tons, which compares with the high record of 40,361,000 tons in 1923.

Production of rolled steel last year fell off one-sixth from that of 1923. Structural steel output, however, equaled that of the year before, and the amount of steel going into building and construction work, 18 per cent of all the steel, was nearly as large as for 1923. Railroad demand accounted for 28 per cent of the steel consumption in 1924, or 1 per cent more than the preceding year, but 13 per cent less in actual tonnage. The steel required for automobile manufacture dropped from 11 per cent of the total in 1923 to 9 per cent last year, while the oil industry showed an 800,000-ton drop in the year's consumption of steel.

Reports to THE IRON AGE show only seven open-hearth steel furnaces built in 1924, adding 375,000 tons a year to the country's capacity. The building of nine furnaces is planned for 1925, five by independent steel companies.

But one new blast furnace, annual capacity 150,000 tons, was started in 1924. Four new furnaces are under construction, capacity 660,000 tons a year. Three will be ready in 1925.

Both of THE IRON AGE composite prices advanced this week, pig iron going to $22.17 from $22.09, and finished steel to 2.56c. per lb. from 2.546c. Pig iron is now at its highest since mid-April, but is only 29c. higher than a year ago. Finished steel is at the highest point since mid-July, but is $4.30 a ton lower than on Jan. 1, 1924.

Pittsburgh

Price Tendency Upward—Cold Weather Hampers Railroads

PITTSBURGH, Dec. 29.—The well filled up condition of steel manufacturers in this and nearby districts in respect to first quarter business is reflected in increased indifference about additional obligations and it would occasion no great surprise if buyers who found it necessary to have additional coverage had to pay higher prices. The tendency of the market is plainly upward, and if there has been any underestimating of the early 1925 requirements the price advantage rests with the manufacturer.

Many of the manufacturers claim to be solidly committed for the first quarter and those who are not in this position appear to have sold as heavily as they care to at recent prices and now want more money on

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Dec. 29, 1924	Dec. 22, 1924	Nov. 25, 1924	Dec. 31, 1923
No. 2X, Philadelphia‡	$25.01	$25.01	$23.76	$24.26
No. 2, Valley furnace†	22.00	22.00	20.50	22.00
No. 2, Southern, Cin'ti†	24.05	24.05	22.05	25.05
No. 2, Birmingham, Ala.†	20.00	20.00	18.00	21.00
No. 2 foundry, Chicago*	23.50	23.00	21.50	23.00
Basic, del'd, eastern Pa.	23.50	23.50	21.50	23.25
Basic, Valley furnace	21.50	21.50	20.00	21.00
Valley Bessemer, del. P'gh	24.26	24.26	22.26	24.76
Malleable, Chicago*	23.50	23.00	21.50	23.00
Malleable, Valley	22.00	22.00	20.50	22.00
Gray forge, Pittsburgh	23.26	23.26	21.76	23.26
L. S. charcoal, Chicago	29.04	29.04	29.04	29.15
Ferromanganese, furnace	110.00	105.00	105.00	109.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Bess. billets, Pittsburgh	37.00	36.00	35.50	40.00
O.-h. billets, Pittsburgh	37.00	36.00	35.50	40.00
O.-h. sheet bars, P'gh	38.00	37.00	37.00	42.50
Forging billets, base, P'gh	42.50	42.50	40.50	45.00
O.-h. billets, Phila	41.67	41.67	41.67	45.17
Wire rods, Pittsburgh	48.00	48.00	45.00	51.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	2.00	2.00	1.90	2.35
Light rails at mill	1.80	1.80	1.80	2.25
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.32	2.32	2.32	2.62
Iron bars, Chicago	2.00	2.00	2.00	2.40
Steel bars, Pittsburgh	2.10	2.10	2.10	2.40
Steel bars, Chicago	2.10	2.10	2.10	2.50
Steel bars New York	2.44	2.44	2.34	2.74
Tank plates, Pittsburgh	2.00	1.90	1.90	2.50
Tank plates, Chicago	2.20	2.20	2.20	2.60
Tank plates, New York	2.34	2.34	2.14	2.74
Beams, Pittsburgh	2.10	2.10	2.10	2.50
Beams, Chicago	2.20	2.20	2.20	2.60
Beams, New York	2.34	2.34	2.24	2.74
Steel hoops, Pittsburgh	2.50	2.50	2.50	3.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	Dec. 29, 1924	Dec. 22, 1924	Nov. 25, 1924	Dec. 31, 1923
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.60	3.60	3.50	3.75
Sheets, black, No. 28, Chicago dist. mill	3.70	3.70	3.60	...
Sheets, galv., No. 28, P'gh	4.75	4.75	4.60	4.90
Sheets, galv., No. 28, Chicago dist. mill	4.85	4.85	4.70	...
Sheets, blue, 9 & 10, P'gh	2.70	2.70	2.70	3.00
Sheets, blue, 9 & 10, Chicago dist. mill	2.80	2.80	2.80	...
Wire nails, Pittsburgh	2.85	2.85	2.75	3.00
Wire nails, Ch'go dist. mill	2.95	2.95	2.85	...
Plain wire, Pittsburgh	2.60	2.60	2.50	2.75
Plain wire, Ch'go dist. mill	2.70	2.70	2.60	...
Barbed wire, galv., P'gh	3.55	3.55	3.45	3.80
Barbed wire, galv., Chicago dist. mill	3.65	3.65	3.55	...
Tin plate, 100 lb. box, P'gh	$5.50	$5.50	$5.50	$5.50
Old Material, Per Gross Ton:				
Carwheels, Chicago	$21.50	$21.50	$19.00	$20.00
Carwheels, Philadelphia	19.50	19.50	19.00	19.50
Heavy steel scrap, P'gh	22.00	22.00	20.00	19.50
Heavy steel scrap, Phila	21.00	21.00	19.00	17.50
Heavy steel scrap, Ch'go	19.75	19.25	17.50	16.75
No. 1 cast, Pittsburgh	19.50	19.50	18.50	21.00
No. 1 cast, Philadelphia	20.50	20.00	18.50	20.50
No. 1 cast, Ch'go (net ton)	20.00	19.50	18.00	20.00
No. 1 RR. wrot., Phila	21.00	21.00	19.00	19.00
No. 1 RR. wrot. Ch'go (net)	17.25	17.00	16.00	15.50
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$4.15	$3.75	$3.15	$3.75
Foundry coke, prompt	5.00	4.50	4.25	4.75
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	15.00	14.87½	14.00	13.25
Electrolytic copper, refinery	14.62½	14.50	13.75	12.75
Zinc, St. Louis	7.80	7.57½	6.85	6.27½
Zinc, New York	8.15	7.92½	7.20	6.62½
Lead, St. Louis	9.80	9.62½	8.60	7.75
Lead, New York	10.15	10.00	9.00	8.00
Tin (Straits), New York	59.00	57.25	54.25	46.75
Antimony (Asiatic), N. Y.	17.50	14.00	14.50	9.75

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market report on other pages.

THE IRON AGE Composite Prices

Dec. 29, 1924, Finished Steel, 2.560c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 88 per cent of the United States output of finished steel.

Dec. 22, 1924,	2.546c.
Dec. 2, 1924,	2.531c.
Dec. 31, 1923,	2.775c.
10-year pre-war average,	1.689c.

Dec. 29, 1924, Pig Iron, $22.17 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham.

Dec. 22, 1924,	$22.09
Dec. 2, 1924,	20.71
Dec. 31, 1923,	21.88
10-year pre-war average,	15.72

1924 to Date High	1924 to Date Low		1923 High	1923 Low
2.789c. Jan. 15	2.460c., Oct. 14	Finished Steel	2.824c., April 24	2.446c., Jan. 2
$22.88, Feb. 26	$19.21, Nov. 3	Pig Iron	$30.86, March 20	$20.77, Nov. 20

remaining tonnage to bring up their general price averages. The leading producer of plates since a week ago has advanced from the minimum of 1.90c. to a minimum of 2c. base, Pittsburgh. In semi-finished steel the situation also is very strong, as producers are heavily obligated and are not anxious for more business, this being evident from their present asking prices, which are $5 a ton above the levels at which considerable first quarter tonnage was taken at about election time.

Production of steel suffered some recession last week on account of the observance of the holidays, and it is probable that this week may see no material recovery since there is apt to be some absenteeism around the New Year holiday. So far as this and nearby districts are concerned, December ingot output will average close to 80 per cent of capacity. The outlook for January is for an even higher rate of production because the mills have the specifications and manufacturers who have been operating somewhat below the general average are ordering in additional capacity.

Extremely cold weather has somewhat hampered railroad operations, but seemingly has interfered less with the movement of steel than of coal and coke. A rather stiff advance in spot coke prices since a week ago is partly explained by the fact that car placements

have decreased and coke producers could not ship as freely as usual.

Pig iron producers still are very firm in their price ideas, but there has been so little business that they have not been able to realize the full prices to which they believe they are entitled in view of the recent advance in coke prices. Some negotiations for second quarter tonnages of furnace coke are reported, but producers are talking $6 for that period and this is well above the ideas of the blast furnace interests.

The scrap market has quieted down considerably following the recent activity by local and Youngstown steel companies which resulted in a turnover of about 100,000 tons of the open-hearth grades, but prices are very firm because supplies are light and there is the support of the dealers short of the market.

Pig Iron.—The market is firm but inactive. Some melters are interested in additional supplies for first quarter and for their second quarter requirements, but actual business is restricted by inventory considerations. Recent prices are holding, not because of large sales, but because producers are well obligated and see further advances in producing costs ahead. It is now estimated that the higher wages to be paid by Connellsville producers will add $1 to the original contract price on first quarter coke tonnages. This means that coke for that period will cost from $4.25 to $4.50 in most cases, and $4.75 to $5 per net ton at ovens in a few instances. There are very few merchant furnaces which can produce a ton of pig iron from a net ton of coke. In addition, the indications point to higher ore prices and that would become a factor in costs toward the end of the second quarter of the year, as not a few producers are stocked much beyond the opening of late navigation in April. It is these considerations that probably explain an unwillingness on the part of pig iron producers to name prices yet for second quarter tonnages. There is no change in quotations but most of the business is at the lower rather than the higher figure.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.76 per gross ton:

Basic	$21.50 to $22.00
Bessemer	22.50 to 23.00
Gray forge	21.50 to 22.50
No. 2 foundry	22.00 to 23.00
No. 3 foundry	21.50 to 22.50
Malleable	22.00 to 23.00
Low phosphorus, copper free	29.00

Ferroalloys.—Makers of ferromanganese are very firm in their price ideas and while no sales are noted of either domestic or British material at the lately established price of $110, it is asserted that some buyers who failed to purchase before the advance have failed in the effort to secure supplies at $105. Makers of 50 per cent ferrosilicon have had little or no difficulty in lining up 1925 business at the full quotation, which also has become the quotation on spot tonnages. Bessemer ferrosilicon and silvery iron producers have announced the re-establishment of former price schedules, from which there had been considerable deviation in the past few months. Spiegeleisen is fairly active. Prices are given on page 111.

Semi-Finished Steel.—All producers have very firm price ideas, because all are heavily committed against first quarter steel output, either in finished or semi-finished form, and the bulk of it being at what are regarded as low and unprofitable prices, the effort now is to get prices that will bring up the average. Prices below $40 for sheet bars are uninteresting to most makers, but there have been no sales at that price in this and nearby districts. In a general way, $38 represents the top price on sales of any size and in billets and slabs, and while there are quotations of as high as $38 and $38.50, $37 appears to have been as high as any business lately has been done. There is not much real activity, since practically all mills which buy rather than make their steel are covered by contracts and there is no evidence that the makers are falling down on contract shipments, necessitating supplementary purchases by the non-integrated mills. Wire rods, forging billets and skelp are at recent prices, but new buying is light, since users contracted for much tonnage before prices went up recently. Observance of the yuletide holidays means some slowing down in steel works activities, but no material recession in production, which for this and nearby districts averages above 80 per cent of capacity. Prices are given on page 111.

Iron and Steel Bars.—All makers have heavy steel bar specifications for January and some for even more extended delivery. Strictly new business is not heavy, but there are no makers who are "hungry" for business just now, and the market is very firm at 2.10c., base, Pittsburgh, with some producers asking that price f.o.b. mill. The leading producer here would probably take second quarter business at that price, but independent mills do not seem willing to sell that far ahead at present. Iron bars are selling well at firm prices. Prices are given no page 110.

Structural Material.—All makers in this and nearby districts are quoting 2.10c. base, on large structural shapes with much firmness. There is only a moderate amount of business at that figure, since the fabricating companies were given such generous protection at lower figures and the structural steel market still is on a basis well below 2.10c. for plain material. Prices are given on page 110.

Plates.—The market here is at a minimum of 2c. base, Pittsburgh, as the leading producer who hitherto has been quoting 1.90c. has gone to 2c., to which independents advanced a few weeks ago. Some of the latter are quoting 2.10c. Beside considerable railroad car business, the position of local mills is helped by the fact that Chicago mills are so heavily committed that they cannot make the required deliveries and more Western business is coming to this district than was recently true. Prices are given on page 110.

Wire Products.—January specifications are heavy enough to insure the absorption of probable production of local mills and will probably provide a draft upon stocks of some mills, which report specifications to be well in excess of probable output. There seems to be some irregularity in the secondary market, as some jobbers are giving way some of the advantage of purchases made prior to the late November advance in mill prices. But mill quotations are firm. February should also be a good month, as jobbers must specify by Feb. 1 on their 60-day contracts, and it is likely in the absence of signs of lower prices that specifications will be large. This branch of the steel industry is working about 80 per cent of capacity. Prices are given on page 110.

Rails and Track Supplies.—Demand for spikes and track supplies is steady rather than active with makers here. Western railroads were able to cover their requirements for the first half of 1925 and in some cases for the entire year with Western makers, and that territory is not now providing much business for local makers. Eastern roads have been covered for the first quarter only and will have to buy later. The New York, New Haven & Hartford Railroad was a recent buyer of 5000 kegs of spikes, the business going to an Eastern producer. Makers of light rails are trying to get more money, but so far have not been successful, because demands are so small. Prices are given on page 110.

Cold-Finished Steel Bars and Shafting.—Makers in this district have become well obligated against first quarter production and January specifications are reported as large. Tonnage moving on contracts carries a price of 2.70c. base, Pittsburgh district mills, but on other shipments 2.80c. is the ruling price. Ground shafting is priced at 3.20c., base, f.o.b. mill for lots of a carload or more.

Hot-Rolled Flats.—Practically all producers are well obligated for first quarter, but generally at prices that now have no appeal, with unfinished steel getting more costly. Some mills are seeking higher prices, but consumers are well covered by contracts and with deliveries against contracts free and prompt, there is not enough business to sustain higher quotations. Prices are given on page 110

Cold-Rolled Strips.—All makers want more than 4c., base, Pittsburgh, but it is not easy to get more, because consumers were able to secure so much of their first quarter requirements at that figure. Productive capacity in this product has grown so materially in the past few years that it takes a very full consumption to give all producers a good business. Competition for business has been keen in the past 60 days and the effort to establish the market at 4.15c. has not been successful.

Tubular Goods.—Interest in line pipe still is strong because so many of the oil companies figure that they can buy to better advantage now than by waiting. The Humble Pipe Line Co. is projecting a line from its pumping station, Comyn, Tex., to the Big Lake field in Reagan County, which will require 200 miles of 8-in. pipe, and the Houston Oil Co. has plans for a gas line from the natural gas belt of Texas, a short distance south of San Antonio. The recent order of the Hope Natural Gas Co. for approximately 100 miles of 20-in. plain end pipe for West Virginia will be furnished by the leading independent maker of steel pipe. Demand for merchant pipe in the butt-weld sizes is good, but lap-welded goods still are rather sluggish, although an advance in Pennsylvania crude oil, if followed in the other fields, will probably mean a greater demand for oil well pipe. Boiler tubes are selling fairly well, but prices still favor buyers. Discounts are given on page 110.

Sheets.—Buyers are specifying well against orders placed in November and December, and mill operations are on a rising scale. Consumers generally are so well covered against early 1925 requirements that they are disposed to see how well secondary consumption expands before making additional purchases. Strictly new business is light, but this is partly due to the fact that there are few mills that can take on much business for shipment before the latter part of February. It is still possible to buy black sheets at 3.50c. base, Pittsburgh, but most of the producers are quoting the full market price on this and the other finishes. Prices are given on page 110.

Tin Plate.—The story on tin plate for the first half of this year has been written. Practically all makers are sold up against probable production for that period and the business merely resolves itself into one of specifications against contracts. The American Sheet & Tin Plate Co. is fully sold up against the production of its Gary and Elwood, Ind., plants, but this fact has caused no advance in delivered Chicago price because all companies appear to have covered their customers in that territory on a basis of $5.60, f.o.b. Gary, or $5.65 into Chicago for standard cokes.

Bolts, Nuts and Rivets.—The makers in this district are fairly busy, but the basis seems to be on specifications against fourth quarter tonnages. A fair amount amount of first quarter business has been taken, but specifications are not being made freely. Prices show no further change. They are given on page 111.

Coke and Coal.—Coke prices have grown materially stronger since a week ago, because of some interruption to production occasioned by the holiday and the fact that severely cold weather has somewhat hampered the movement of coke and the placement of cars. This situation has forced a good many consumers into the market for small tonnages and sales of spot furnace coke are noted all the way from $4.15 to $4.50 per net ton at ovens, an advance of 40c. a ton in the minimum price as compared with a week ago. Offerings of spot foundry coke have lately moved rather easily at $5 and there are some instances where as high as $6 was paid by consumers who were pressed for supplies. Coke oven operators are talking $5 per net ton for such first quarter tonnage as they have available and have mentioned $6 as their idea on second quarter tonnages. The advance in coke has been considerably more rapid than that in pig iron and producers of the latter feel that coke has been marked up too rapidly to hold. There is a very firm market for coking coal, but other grades are still slow and not very steady in price. Prices are given on page 111.

Old Material.—Prices are holding at about recent levels, but are very firm, notably on the better grades of railroad material, which are in more active demand from the steel foundries. On the steel works grades, dealers still have stiff price ideas, not only because of the recent purchases by Pittsburgh and Youngstown mills, which all together total more than 100,000 tons, but because the current offerings are moderate and there is the expectation that a large local user who has been out of the market for about a year will soon be a buyer. It is reported that the compressed sheet scrap of the Westinghouse Electric & Mfg. Co. for January shipment sold at $19.25, East Pittsburgh, which would mean $19.88 at the nearest consuming point, without profit to the dealer. Standard Tin Plate Co., Canonsburg, will sell 1000 tons of compressed sheet scrap on Jan. 2.

We quote for delivery to consumer's mill in the Pittsburgh and other districts taking the Pittsburgh freight rate as follows:

Per Gross Ton	
Heavy melting steel	$22.00 to $22.50
No. 1 cast, cupola size	19.50 to 20.00
Rails for rolling, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	22.00 to 23.00
Compressed sheet steel	20.00 to 20.50
Bundled sheets, sides and ends	19.00 to 19.50
Railroad knuckles and couplers	23.00 to 23.50
Railroad coil and leaf springs	23.00 to 23.50
Low phosphorus blooms and billet ends	26.50 to 27.00
Low phosphorus plate and other material	25.00 to 26.00
Railroad malleable	21.00 to 21.50
Steel car axles	23.00 to 23.50
Cast iron wheels	20.00 to 20.50
Rolled steel wheels	23.00 to 23.50
Machine shop turnings	17.50 to 18.00
Sheet bar crops	24.00 to 25.00
Heavy steel axle turnings	18.50 to 19.00
Short mixed borings and turnings	15.00 to 15.50
Heavy breakable cast	18.00 to 18.50
Stove plate	17.00 to 17.50
Cast iron borings	16.50 to 17.00
No. 1 railroad wrought	19.00 to 19.50
No. 2 railroad wrought	22.00 to 22.50

President Campbell Expects Good Business Throughout New Year

YOUNGSTOWN, Dec. 29.—President James A. Campbell of the Youngstown Sheet & Tube Co. expects good business throughout 1925. "Most of the steel companies have contracts covering their output, at least of the more important products, during the first quarter. It should be understood, however, that these contracts are for the maximum requirements of the customer and form no assurance in themselves that all of the material covered by them will be specified and taken. It is my belief, however, that this tonnage will be generally taken during the first quarter, for the reason that prices at which these contracts were made are somewhat lower than those now prevailing."

"My reason for expecting good business throughout the year," added Mr. Campbell, "are that the farmer is now receiving higher and more profitable prices for his products, including cotton, cattle and hogs, than for several years; the railroads are, I believe, making more money than at any time in their history. The population is growing daily and must have additional houses to provide shelter and commercial buildings of all kinds must be erected to keep pace with the progress of the country. The only thing that might change the situation so far as I can see is the possibility of advances in production costs and selling prices of materials so rapidly as to check all kinds of investment and slow down business activity. I do not believe this will happen because the country now has production capacity sufficient to maintain competition in all lines, and thus prevent dangerous inflation."

In a statement in regard to the economic prospects of the new year, Secretary Hoover reviews conditions in the United States and foreign lands and declares that "altogether forces in motion both at home and abroad mark solid progress toward peace and toward prosperity for the coming year." He believes that business men during the past four years have gained greatly in understanding of the basic factors which create healthy prosperity as distinguished from over expansion, as well as in understanding of their responsibilities.

Chicago

Pig Iron Again Advanced—Demand for Steel Maintained

CHICAGO, Dec. 29.—Although market activity is slowing down as Jan. 1 approaches, business during Christmas week exceeded expectations. In pig iron there was another advance of 50c. a ton. In the heavier finished steel products, fresh orders as well as specifications were up to the average for the preceding weeks of the month. Sales of those commodities during the entire month will show a gain of fully 25 per cent over November. An independent mill, in fact, has the heaviest commitments in its history.

Steel prices are strong, but it is unlikely that Chicago mills will make further advances until the market goes up at Pittsburgh. Producers in the Pittsburgh district are not yet so well booked as Chicago mills.

Railroad buying has been an important factor in placing Chicago producing capacity in its present enviable position. Out of 137,301 freight cars ordered up to the last week of December, 62,575 were placed with car plants in Chicago territory. For this equipment Chicago mills received orders for 500,000 tons of plates, shapes and bars and 250,000 axles. Railroad buying promises to be a feature for some time to come. During the past week, the Chicago & Northwestern has placed 41,000 tons of rails, and the Northern Pacific and the Missouri Pacific have ordered 1000 freight cars each.

Production continues to expand. With the blowing in of one furnace each at Gary and South Chicago, the number of active steel works stacks in this district has been increased to 28 out of 34. The blowing in of the Inland Steel Co.'s third furnace this week or next will increase the total to 29. Steel output ranges from 87 to 90 per cent.

Pig Iron.—Buying has been heavier than expected during Christmas week, and local iron has again advanced, now commanding from $23.50 to $24, base furnace. As Jan. 1 approaches the expected inventory lull is finally settling over the market, but this period is likely to be of much shorter duration than usual. Notwithstanding the propensity of buyers to ask that deliveries be deferred until January, shipments during December were very heavy, being exceeded only by those for the months of January, February and March. New inquiries include 2000 tons of foundry and 400 tons of foundry for second quarter wanted by melters in the Chicago metropolitan district. An active period of spot buying is looked for in view of the fact that a considerable number of melters failed to anticipate their full needs when they bought for first quarter. A strong second quarter buying movement is also expected. A second Federal furnace will go into blast this week and a third Iroquois this week or next. Southern foundry for barge and rail shipment has advanced to $25.18, delivered. Silvery has been sold at the full schedule and a recent order for 14 to 16 per cent ferrosilicon was placed at $45.75, delivered. The quotation of $44 delivered, however, has not yet been withdrawn by an electric producer.

Quotations on Northern foundry, high phosphorus, malleable and basic iron are f.o.b. local furnaces and do not include an average switching charge of 61c. per ton. Other prices are for iron delivered at consumers' yards.

Northern No. 2 foundry, sil. 1.75 to 2.25	$23.50 to $24.00
Northern No. 1 foundry, sil. 2.25 to 2.75	24.50 to 25.00
Malleable, not over 2.25 sil.	23.50 to 24.00
Basic	23.50 to 24.00
High phosphorus	23.50 to 24.00
Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago	29.04
Southern No. 2 (barge and rail)	25.18
Southern No. 2, sil. 1.75 to 2.25	26.01 to 27.01
Low phos., sil. 1 to 2 per cent, copper free	33.00 to 33.50
Silvery, sil. 8 per cent	35.29
Electric ferrosilicon, 14 to 16 per cent	44.00 to 45.75

Ferroalloys.—We quote a sale of 100 tons of silvery at $33, Eastern furnace. Ferromanganese is inactive.

We quote 80 per cent ferromanganese, $117.56, delivered; 50 per cent ferrosilicon, for 1925 delivery, $82.50, delivered; spiegeleisen, 18 to 22 per cent, $41.58, delivered.

Plates.—The new Wortham, Tex., oil field is developing beyond expectations, and it now appears that considerable additional tankage will have to be bought, although no new orders have yet developed. A local mill has recently booked 150,000 tons of plates, shapes and bars from railroad car builders and additional tonnage is in prospect in view of fresh purchases of cars. The Missouri Pacific has placed 1000 open top cars and the Northern Pacific 1000 box cars.

The mill quotation is 2.20c., Chicago. Jobbers quote 3.10c. for plates out of stock.

Sheets.—Local producers are in the best position in seven or eight months, being booked ahead for at least 60 days on all three finishes of sheets. Prices, however, remain unchanged.

Chicago delivered prices from mill are 3.75c. for No. 28 black, 2.85c. for No. 10 blue annealed, 4.90c. for No. 28 galvanized. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Jobbers quote f.o.b. Chicago: 3.80c. base for blue annealed, 4.50c. base for black, and 5.50c. base for galvanized.

Bars.—The fact that demand for soft steel bars has held up so well during the holidays is considered a good augury. Undoubtedly much heavier specifications can be expected after the inventory taking period has passed. Among the various classes of consumers, the automobile industry alone remains conspicuously conservative. Demand for bar iron shows slow improvement with prices unchanged. Rail steel bar mills are well committed, one important producer being booked through the first quarter on fence post steel.

Mill prices are: Mild steel bars, 2.10c.; common bar iron, 2c. to 2.10c., Chicago; rail steel, 2c. to 2.10c., Chicago mill.

Jobbers quote 3c. for steel bars out of warehouse. The warehouse quotations on cold-rolled steel bars and shafting are 3.80c. for rounds and 4.30c. for flats, squares and hexagons; 4.15c. for hoops and 3.65c. for bands.

Jobbers quote hard and medium deformed steel bars at 2.60c.

Wire Products.—The market has been quiet during the inventory taking period, but heavy specifications are looked for early in the new year. For mill prices, see page 110.

We quote warehouse prices f.o.b. Chicago: No. 8 black annealed, $3.15 per 100 lb.; common wire nails, $3.25 per 100 lb.; cement coated nails, $2.55 per 100 lb.

Rails and Track Supplies.—The Chicago & North Western has bought 41,000 tons of rails, distributed as follows: 27,500 tons to Illinois Steel Co., 7500 tons to Inland Steel Co. and 6000 tons for the Omaha road to Bethlehem Steel Co. The Soo Line order mentioned last week was distributed as follows: 6500 tons to Illinois Steel Co., 3000 tons to Bethlehem Steel Co. and 1400 tons to Inland Steel Co. Frog and switch manufacturers have placed orders for 25,000 tons of rails. Orders for track supplies have been light, although one producer has booked 700 tons of rail joints.

Standard Bessemer and open-hearth rails, $43; light rails, rolled from billets, 1.90c. to 2c., f.o.b. maker's mill.

Standard railroad spikes, 2.90c. mill; track bolts with square nuts, 3.90c. mill; steel tie plates, 2.35c., f.o.b. mill; angle bars, 2.75c., f.o.b. mill.

Jobbers quote standard spikes out of warehouse at 3.45c. base, and track bolts, 4.45c. base.

Cast Iron Pipe.—Additional purchases have been made by the larger municipalities, indicating that the mid-winter buying movement is getting under way. Minneapolis has placed 1800 tons with the American Cast Iron Pipe Co. at a price which figures back to slightly over $40, base Birmingham. Madison, Wis., has awarded 1000 tons of 4- to 20-in. to the same company. The pipe was bought on a per foot basis and more favorable terms were made because practically the entire tonnage was in 16-ft. lengths. Five different diameters were purchased and the average price

on a per ton basis was about $39.15, base Birmingham. The National Cast Iron Pipe Co. has booked 200 tons for Quincy, Ill. St. Paul, Minn., takes bids Dec. 30 on 2600 tons of 4- to 16-in.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $52.20; 6-in. and over, $48.20; Class A and gas pipe, $4 extra.

Structural Material.—The steel for a new power plant at East St. Louis, 2400 tons, has been awarded to the Fort Pitt Bridge Works. Other lettings are relatively small and the market is evidently marking time until after Jan. 1.

The mill quotation on plain material is 2.20c., Chicago. Jobbers quote 3.10c. for plain material out of warehouse.

Bolts and Nuts.—Specifications against fourth quarter contracts are heavy and this is not surprising in view of the fact that buyers thereby get the benefit of lower prices prevailing before the recent advance. At the same time numerous contracts for first quarter are being booked on the new basis. An encouraging number of orders are also being received at the new prices. For mill prices, see page 111.

Jobbers quote structural rivets, 3.50c.; boiler rivets, 3.70c.; machine bolts up to ⅞ x 4 in., 55 per cent off; larger sizes, 55 off; carriage bolts up to ⅞ x 4 in., 50 off; larger sizes, 50 off; hot pressed nuts, squared, tapped or blank, $3.50 off; hot pressed nuts, hexagon, tapped or blank, $4 off; coach or lag screws, 60 per cent off.

Old Material.—One of the smaller independent steel interests has purchased 30,000 tons of open-hearth grades, paying $20 delivered for heavy melting. The market is still strong in all departments, but outside of the purchase mentioned, there has been little activity and it is apparent that the holidays have caused a suspension of buying until the turn of the year. Among the railroads, the Burlington offers 6000 tons, and the Michigan Central a blind list.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	$20.00 to $20.50
Cast iron car wheels	21.50 to 22.00
Relaying rails, 56 and 60 lb.	26.00 to 27.00
Relaying rails, 65 lb. and heavier	27.00 to 32.00
Forged steel car wheels	23.50 to 24.00
Railroad tires, charging box size	23.50 to 24.00
Railroad leaf springs, cut apart	23.50 to 24.00
Rails for rolling	21.00 to 21.50
Steel rails, less than 3 ft.	21.50 to 22.00
Heavy melting steel	19.75 to 20.50
Frogs, switches and guards cut apart	19.75 to 20.25
Shoveling steel	19.50 to 20.00
Drop forge flashings	15.00 to 15.50
Hydraulic compressed sheets	17.00 to 17.50
Axle turnings	17.00 to 17.50
Steel angle bars	20.50 to 21.00
Steel knuckles and couplers	23.50 to 24.00
Coil springs	24.00 to 24.50
Low phos. punchings	20.50 to 21.00
Machine shop turnings	12.50 to 13.00
Cast borings	15.00 to 15.50
Short shoveling turnings	15.00 to 15.50
Railroad malleable	21.00 to 21.50
Agricultural malleable	20.00 to 20.50

Per Net Ton

Iron angle and splice bars	21.00 to 21.50
Iron arch bars and transoms	22.00 to 22.50
Iron car axles	27.50 to 28.00
Steel car axles	22.00 to 22.50
No. 1 busheling	15.50 to 16.00
No. 2 busheling	11.75 to 12.25
Pipes and flues	14.00 to 14.50
No. 1 railroad wrought	17.25 to 17.75
No. 2 railroad wrought	17.50 to 18.00
No. 1 machinery cast	20.00 to 20.50
No. 1 railroad cast	18.50 to 19.00
No. 1 agricultural cast	18.50 to 19.00
Locomotive tires, smooth	18.75 to 19.25
Stove plate	16.00 to 16.50
Grate bars	16.00 to 16.50
Brake shoes	16.00 to 16.50

Reinforcing Bars.—The concrete bar market has been quiet during the holidays, but heavier buying is looked for after the first of the year. The general contract for the Morrison Hotel addition has been awarded to John Griffiths & Son Co., and the bars, amounting to 1200 tons, were placed with Olney J. Dean & Co. Prices remain unchanged at 2.60c., Chicago warehouse.

Lettings include:

Evening News garage building, Detroit, 600 tons, to McRae Steel Co.

Illinois Central, bridge at Belle Rive and Blueford, Ill., 200 tons, to Concrete Engineering Co.

Victor Adding Machine Co. plant addition, Chicago, 100 tons, to Joseph T. Ryerson & Son.

Pending work includes:

Sections 11 and 12, South Water Street double decking, Chicago, 200 tons, figures to be asked this week.

Muskegon high school building, Muskegon, Mich., 200 tons, general contract awarded to O. F. Miller, Kalamazoo, Mich.

Coke.—The Illinois Steel Co. has placed orders for 48,000 tons of by-product furnace coke. This company is usually forced to buy outside coke during periods of heavy operations and it was to supply this deficiency that the construction of an addition to the by-product plant at Gary was undertaken. Two batteries of 70 ovens each are now being built. The coke market is steadily gaining in strength, both on account of the Connellsville situation and the renewed demand for domestic fuel resulting from recent severe weather. Local by-product foundry coke remains unchanged at $10.75, delivered Chicago switching district.

Great Activity of Youngstown Plants

YOUNGSTOWN, Dec. 29.—Operations of iron and steel properties in the Youngstown district approached near-capacity this last week in the year, contrary to the schedules of other years, when production usually lags at this season. Pressure for deliveries in rolled steel products, however, is heavy and for this reason mills are accelerating output.

Of 52 independent open-hearth furnaces, 46 were scheduled this week for melting, and 28 of 30 Steel Corporation units. Owing to the necessity for somewhat frequent relining of open-hearth furnaces, due to the high temperatures to which they are subjected, a number are always down, and the schedule this week is about as close to capacity as it is possible to bring such departments.

Bessemer steel plants are engaged at an 80 per cent average in this district.

Such interests are the Trumbull Steel Co., Sharon Steel Hoop Co., A. M. Byers Co. and the Carnegie Steel Co. are operating their properties close to a capacity basis. The rate of steel ingot output this week of the Youngstown Sheet & Tube Co. is placed at 95 per cent, and of the Republic Iron & Steel Co. at 90 per cent.

No. 1 blast furnace of the Republic company at Haselton started to make iron this week.

The principal fabricating interests are still pushing production, despite the inventory period, but most of the smaller companies have curtailed for the time being.

New Construction at Canadian Plants

The Dominion Iron & Steel Co., Ltd., Sydney, N. S., plans the installation during 1925 of a 55-in. x 60-in. reversing blooming mill engine; a new blooming conveyor table, 210 ft. long; the electrification of bloom shear drive; the installation of three 500 turbine driven centrifugal boiler feed pumps; the relining and repairing of No. 1 blast furnace and an 80 ft. x 144 ft. extension to the wire and nail mill warehouse.

The Hull Iron & Steel Foundry, Ltd., Hull, Quebec, is building, near Ogdensburg, N. Y., a new plant known as the Coplan Steel Corporation, Inc. The plant, which is practically completed, is built on a site of a little over 100 acres, with a deep water dock on the St. Lawrence River, one-quarter mile long. The equipment of the plant is the same as that of the Canadian unit. Some of the principal features are a steel convertor and electric furnace, having a capacity of about 1000 tons per month. The product will be the same as the Canadian plant, namely, chromite heat-resisting steel grate bars for locomotive work, general railroad castings and special mining steels, consisting chiefly of manganese ball mill liners and chrome forged balls for ball mills.

New York

Radiator Company Buys for Bayonne Plant—Year Ends Quietly

NEW YORK, Dec. 29.—With the exception of the sale to the American Radiator Co. selling of pig iron last week was limited to very small lots, and the total in this district was not much over 1000 tons. This week has opened very quietly, but one seller has sold about 4000 tons to belated buyers for the first quarter. The American Radiator Co. is credited with buying 4000 tons for its Bayonne plant for second quarter. The details are not known. The prevailing prices at Buffalo are on the basis of $23 for No. 2 plain, while in eastern Pennsylvania the basis is now $23.50, with some producers out of the market and others quoting $24. Differentials charged by eastern Pennsylvania companies vary, but the tendency is to ask relatively higher prices for the irons high in silicon on account of the increased cost of coke and the resulting higher costs of the pig irons having the larger silicon content. The prevailing eastern Pennsylvania price for No. 1 is now $25, furnace. Indications are that the melt is gradually improving.

We quote delivered in the New York district as follows having added to furnace price $2.52 freight from eastern Pennsylvania, $4.91 from Buffalo and $5.44 from Virginia:

East. Pa. No. 2, sil. 1.75 to 2.25	$26.02
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	27.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	26.52
Buffalo, sil. 1.75 to 2.25	27.91
No. 2 Virginia, sil. 1.75 to 2.25	$30.44 to 31.44

Ferroalloys.—Buying of ferromanganese has been so heavy recently that the market now is quiet with sales confined to carload and small lots at the new price of $110, seaboard basis. Sales of spiegeleisen continue in good volume at the new price of $33 to $34, furnace, for the higher grade.

Cast Iron Pipe.—No important contracts have been awarded by municipalities, but it is understood that the city of New York will soon be in the market for a large tonnage of water pipe. The outlook for the near future is very favorable. The National Cast Iron Pipe Co. has booked the following orders for water pipe: 1700 tons for St. Louis; 800 tons for Spokane, Wash., and 600 tons for Tulsa, Okla.

We quote per net ton, f.o.b. New York, in carload lots, as follows: 6-in. and larger, $54.60 to $55.60; 4-in. and 5-in., $59.60 to $60.60; 3-in., $69.60 to $70.60, with $5 additional for Class A and gas pipe. Demand for soil pipe continues active and discounts have been advanced 2½ points. Discounts of both Northern and Southern makers of soil pipe, f.o.b. New York, are as follows: 6-in., 40½ to 41¼ per cent off list; heavy, 50 to 51¼ per cent off list.

Warehouse Business.—Quietness still prevails in most quarters, although one large warehouse reports the best pre-holiday business for many years. Galvanized sheets are very strong and there is an impending increase in price. Spring steel continues to lag, orders being few and lean. Some improvement is noted in tool steel and wrought iron pipe is in better demand, under the influence of good feeling on the part of buyers. Most lines are expected to improve shortly after the holidays and stock-taking time. Prices are given on page 114.

Finished Iron and Steel.—Signs are that there will be a period of several weeks quiet so far as much new buying is concerned, but there is no stay to the flow to the mills of specifications against contracts. In numerous cases efforts are being made to get mill acceptance to increases of contracted tonnages—of contracts at lower than today's market prices, of course—and these instances are taken to prove that steel is going into consumption. In actual bookings against mills December is a banner month.

We quote for mill shipments, New York delivery, as follows: Soft steel bars, 2.44c.; plates, 2.34c. to 2.44c.; structural shapes, 2.34c. to 2.44c.; bar iron, 2.34c.

Old Material.—Shipments on contracts continue in fair volume and prices are strong on all grades. New contracts are evidently temporarily withheld until after the first of the year. One large eastern Pennsylvania consumer which has not contracted for some time, is expected to come into the market for a sizable tonnage after Jan. 1. Heavy melting steel is still being purchased at $18 to $19.75 per ton, depending upon the freight rate to point of delivery. Steel car axles show an advance of 50c. per ton to a range of $21.50 to $22.50 per ton, the buying price New York, based on recent sales to eastern Pennsylvania. No. 1 cast is more active than for several months and prices are strong, as a result of a heavier demand from the foundries.

Buying prices per gross ton New York follow:

Heavy melting steel, yard	$14.00 to $14.50
Heavy melting steel, railroad or equivalent	15.50 to 16.50
Rails for rolling	16.00 to 16.50
Relaying rails, nominal	24.00 to 25.00
Steel car axles	21.50 to 22.50
Iron car axles	27.00 to 28.00
No. 1 railroad wrought	15.50 to 16.00
Forge Fire	13.00 to 14.00
No. 1 yard wrought, long	15.00 to 16.00
Cast borings (steel mill)	11.50 to 12.00
Cast borings (chemical)	17.00 to 18.00
Machine shop turnings	12.50 to 13.00
Mixed borings and turnings	10.50 to 11.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	13.75 to 14.25
Stove plate	12.75 to 13.25
Locomotive grate bars	14.00 to 14.50
Malleable cast (railroad)	16.00 to 16.50
Cast iron car wheels	16.00 to 17.00
No. 1 heavy breakable cast	14.25 to 14.75

Prices which dealers in New York and Brooklyn are quoting to local foundries per gross ton follow:

No. 1 machinery cast	$17.50 to 18.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 2 cast (radiators, cast boilers, etc.)	14.50 to 15.00

Buffalo

Inquiry for Pig Iron Slackens but Outlook for New Year Is Favorable

BUFFALO, Dec. 29.—Inquiry has dropped off during the holiday season, but the tone is firm and producers are predicting good business for the first part of the next year. Total inquiry for the week was about 5000 tons, including one for 700 tons and two for 500 tons. The Buffalo Foundry & Machine Co. sought 500 to 600 tons. The market seems to be firm at $23 for No. 2 plain; $23.50 for 2.25 to 2.75 silicon and $24.50 for 2.75 to 3.25 silicon. The differentials are firm as shown by transactions in 2.75 to 3.25 silicon foundry at $24.50. Preparations are being made to reline the two idle Wickwire stacks with production scheduled for the spring, possibly April. Meantime this producer has been a factor in the market for the first time in months, to the extent of a small surplus. With the market showing a firm front, producers are talking $24 and $25 price for their iron for the second quarter.

We quote prices f.o.b. gross ton, Buffalo, as follows:

No. 2 plain, sil. 1.75 to 2.25	$23.00
No. 2 foundry, sil. 2.25 to 2.75	23.50
No. 1 foundry, sil. 2.75 to 3.25	24.50
Malleable, sil. up to 2.25	23.00
Basic	23.00
Lake Superior charcoal	29.28

Finished Iron and Steel.—Holiday lull still lingers in the finished market. Very little new inquiry is apparent and specifying has dropped off. One outside mill active in selling in this territory is virtually out of the bar market. Sheet makers report good bookings and the pipe market is improving. One seller reports its deliveries becoming more extended—four weeks in some cases as compared with a week or ten days recently. A local wire maker reports very encouraging prospects for future business. This maker is sold up three months ahead in this material with the demand covering a wide range of wire goods. Its open-hearths are turning out the best production in the history of the plant and every ton of steel is going into finished material. This maker may find itself short of steel presently, the first time since 1920. Prices are firm throughout.

Old Material.—The market is quiet, but with a strong undercurrent. There is very little buying and dealers do not expect any heavy purchasing until the middle of the month at least. One local mill is offering $18 for heavy melting steel, but this does not represent the real strength of the market as the material could not be bought in tonnage at this price. Hydraulic compressed and No. 1 busheling markets are strong, though turnings and borings are still suffering from the effects of the Cleveland embargo.

We quote f.o.b. gross ton, Buffalo, as follows:

Heavy melting steel	$19.50 to $20.00
Low phosphorus, 0.04 and under	21.00 to 22.00
No. 1 railroad wrought	16.50 to 17.00
Car wheels	17.50 to 18.00
Machine shop turnings	13.50 to 13.75
Cast iron borings	14.50 to 15.00
No. 1 busheling	17.50 to 18.00
Stove plate	15.50 to 16.50
Grate bars	14.50 to 15.00
Bundled sheets	12.50 to 13.00
Hydraulic compressed	17.50 to 18.00
Railroad malleable	17.50 to 18.00
No. 1 machinery cast	18.00 to 18.50

Birmingham

Alabama Furnaces Well Supplied with Orders for First Quarter Delivery

BIRMINGHAM, ALA., Dec. 29.—Southern furnace interests will start in on the new year with probable make for the first quarter pretty well covered. Inquiries are still coming in for first-half delivery, and quotations are firm at $20 per ton, No. 2 foundry, with indications of a new buying movement. Two additional blast furnaces are to be started up this week by the Sloss-Sheffield Steel & Iron Co. Two other furnaces of this district are to be gotten in shape, one to add to the general make and the other to replace a furnace which will shortly need relining. A few sales of iron were made recently for immediate delivery in small lots at $20.50 per ton, No. 2 foundry. Stocks of iron, under 70,000 tons of foundry, are expected to be absorbed during the first three months of the year.

We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 2 foundry, 1.75 to 2.25 sil...	$20.00
No. 1 foundry, 2.25 to 2.75 sil...	20.50
Basic	$19.50 to 20.00
Charcoal, warm blast	30.00

Steel.—Steel making ceased but a couple of days for the holidays and a greater production is being sought. Advances in prices of steel products are in prospect. Soft steel bars quoted 2.25c. to 2.30c., Birmingham.

Coke.—Demand is showing some activity while quotations are firmer but not higher. Beehive foundry coke is selling at $5, while by-product foundry is quoted at $4.50 to $5. Production of both beehive and by-product is off a little.

Old Material.—Much old material has been sold for delivery during the next 30 to 60 days and inquiries are steady. Quotations are showing an upward trend, the recent $1 to $1.50 advance in practically all products on the list not stopping the buying. On non-ferrous metals considerable buying is felt and quotations are also inclined upwards.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Cast iron borings, chemical	$15.00 to $16.00
Heavy melting steel	15.00 to 15.50
Railroad wrought	14.00 to 15.00
Steel axles	18.00 to 19.00
Iron axles	19.00 to 20.00
Steel rails	15.00 to 15.50
No. 1 cast	17.00 to 17.50
Tramcar wheels	17.00 to 17.50
Car wheels	16.00 to 17.00
Stove plate	15.00 to 16.00
Machine shop turnings	8.00 to 9.00
Cast iron borings	8.00 to 9.00
Rails for rolling	15.50 to 16.50

Boston

Little Being Done in Pig Iron, but Prices Are Very Strong

BOSTON, Dec. 29.—The old year goes out with buying of pig iron confined to small scattered lots, but with the undertone of the market strong. Eastern Pennsylvania iron today presumably is not obtainable for less than $23.50 furnace base, whereas a year ago it was $23. Buffalo is $23 furnace base, as against $21 to $22 a year ago; Virginia $24 to $25, contrasted with $24 to $26 a year ago; and Alabama, $20 to $20.50 as against $21. With few exceptions New England melters took all the 1924 iron contracted for. Foundries are asking furnaces to rush first quarter iron. A large consumer intimates he may be in the market shortly for several thousand tons No. 2 plain second quarter iron, but prospective business otherwise is developing slowly. Foreign iron owners are inclined to withhold offerings pending possible price advances on domestic brands. During the week ending Dec. 27, 500 tons of Dutch iron arrived at this port, whereas in the previous week two lots of India aggregating 1980 tons were received here.

We quote delivered prices on the basis of the latest reported sales as follows, having added $3.65 freight from eastern Pennsylvania, $4.91 from Buffalo, $5.92 from Virginia and $9.60 from Alabama:

East. Penn., sil. 1.75 to 2.25	$27.15 to $27.65
East. Penn., sil. 2.25 to 2.75	27.65 to 28.15
Buffalo, sil. 1.75 to 2.25	27.91
Buffalo, sil. 2.25 to 2.75	28.41 to 30.92
Virginia, sil. 1.75 to 2.25	29.92 to 30.92
Virginia, sil. 2.25 to 2.75	30.42 to 31.42
Alabama, sil. 175 to 2.25	29.60 to 30.10
Alabama, sil. 2.25 to 2.75	30.10 to 30.60

Coke.—Shipments of coke from ovens to foundries during the last week or ten days of 1924 increased fairly well, and indications are December will be a better month than expected. At least some foundries increased their orders in anticipation of higher prices, but in other cases increased melts have been a factor. The market for by-product foundry coke closes at $11.50 a ton delivered in New England.

Old Material.—There was a further general marking up of old material prices the past week, although the actual tonnage changing hands was small. For heavy melting steel, as high as $16.50 a ton on cars was paid, but the average top price reported is $16. The market for railroad wrought is materially higher with little material available. Yard wrought prices have gone up in sympathy. Rails for rerolling and scrap rails have advanced with the other heavier materials. Cotton ties in long bundles are $11 to $11.25 on cars, whereas in short bundles $12.50 is offered. Interest in chemical borings is again falling off, yet prices are fully maintained. There is, perhaps, a slightly more active call for rolling mill borings, but they as well as mixed borings and turnings are the least active of the steel mill requirements. A small amount of stove plate for eastern Pennsylvania delivery changed hands the past week at $12.50 on cars, but New England consumers evince little interest in such material or in machinery cast.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery cast	$19.50 to $21.00
No. 2 machinery cast	17.00 to 18.00
Stove plates	15.00 to 15.50
Railroad malleable	20.00 to 20.50

The following prices are offered per gross ton lots, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$15.00 to $16.00
No. 1 railroad wrought	16.00 to 16.50
No. 1 yard wrought	15.00 to 15.50
Wrought pipe (1-in. in diam., over 2 ft. long)	13.00 to 13.50
Machine shop turnings	12.00 to 12.50
Cast iron borings, chemical	16.00 to 16.50
Cast iron borings, rolling mill	11.00 to 11.50
Blast furnace borings and turnings	10.00 to 10.50
Forged scrap	12.00 to 12.50
Bundled skeleton	12.00 to 13.00
Bundled cotton ties	11.00 to 11.25
Forged flashings	12.50 to 13.00
Shafting	18.50 to 20.00
Street car axles	18.50 to 19.00
Rails for rerolling	16.50 to 17.00
Scrap rails	15.50 to 16.00

St. Louis

Sales of Basic Amount to About 30,000 Tons —Market Quiet

ST. LOUIS, Dec. 29.—With the sale of between 25,000 and 30,000 tons of basic iron to melters in the St. Louis industrial district during the last two weeks for December to March delivery, the St. Louis Coke & Iron Co. is now virtually sold up for the first quarter of next year. Sales of foundry iron during the last two weeks have been small. The stove makers in St. Louis, Belleville and Quincy have closed down for the holidays, as have most job foundries in the district. The result was that buying ceased until after the holidays. Business has been better than melters had expected. Makers are not pushing sales, and the market is strong, with northern iron at $23 to $23.50, Chicago; southern, $20; Birmingham and Granite City, $24 to $24.50 f.o.b. furnace.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.16 freight from Chicago, $3.28 from Florence and Sheffield (rail and water), $5.17 from Birmingham, all rail, and 81c. average switching charge from Granite City:

Northern fdy., sil. 1.75 to 2.25	$25.16 to $25.66
Northern malleable, sil. 1.75 to 2.25	25.16 to 25.66
Basic	25.16 to 25.66
Southern fdy., sil. 1.75 to 2.25 (rail)	25.17
Southern fdy., sil. 1.75 to 2.25 (rail and water)	22.28 to 23.28
Granite City iron, sil. 1.75 to 2.25	24.81 to 25.31

Finished Iron and Steel.—Additional road and bridge contracts let by the Missouri Highway Commission will require about 335 tons of reinforcing bars and 154 tons of structural steel. Holidays and inventory time make business in most lines quiet.

Coke.—Contracts for foundry iron of by-product ovens in the district are being renewed, a number of 300 to 800 tons being made. There is little or no demand for Connellsville grades.

Old Material.—Old material is 50c. to $1 a ton higher than a week ago. While consumers have made some purchases, it is purely a dealers' market. Dealers are trying to cover short sales. Another reason for higher prices is that other markets are paying more than St. Louis. Dodge Brothers, Detroit, offer 5000 tons of miscellaneous material, and railroad lists include the following: Big Four Lines, blind list; Union Pacific, 2000 tons, and Chicago, Burlington & Quincy, 8000 tons.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

	Per Gross Ton
Iron rails	$18.00 to $18.50
Rails for rolling	20.50 to 21.00
Steel rails, less than 3 ft.	20.50 to 21.00
Relaying rails, 60 lb. and under	25.00 to 26.00
Relaying rails, 70 lb. and over	32.50 to 33.50
Cast iron car wheels	20.00 to 20.50
Heavy melting steel	17.50 to 18.00
Heavy shoveling steel	17.50 to 18.00
Frogs, switches and guards cut apart	19.50 to 20.00
Railroad springs	21.50 to 22.00
Heavy axles and tire turning	13.50 to 14.00
No. 1 locomotive tires	19.50 to 20.00
	Per Net Ton
Steel angle bars	17.50 to 18.00
Steel car axles	21.00 to 21.50
Iron car axles	25.00 to 25.50
Wrought iron bars and transoms	21.00 to 21.50
No. 1 railroad wrought	15.50 to 16.00
No. 2 railroad wrought	15.50 to 16.00
Cast iron borings	11.25 to 11.75
No. 1 busheling	15.50 to 16.00
No. 1 railroad cast	18.00 to 18.50
No. 1 machinery cast	19.00 to 19.50
Railroad malleable	15.50 to 16.00
Machine shop turnings	9.50 to 10.00
Champion bundled sheets	10.00 to 10.50

The Phœnix Utility Co. has awarded the William Cramp & Sons Ship & Engine Building Co. a contract for two 21,500-hp. vertical turbines, complete with governors and auxiliaries for installation in the Cutler plant of the Utah Power & Light Corporation. The Cramp plant is also completing a contract for three 13,000-hp. vertical turbines, which will constitute a part of the extensive superpower development of Japan.

San Francisco

Holidays and Inventories Curtail Business—Outlook for 1925 Encouraging

SAN FRANCISCO, Dec. 27 (*By Air Mail*).—Business during the past week was comparatively small, because of the Christmas holidays and the preparations being made for the taking of inventories. The only award involving more than 100 tons of structural steel was one for 200 tons for the General Petroleum Co. plant in Oakland. Orders for about 3000 tons of plates were placed, however, and awards calling for about 500 tons of reinforcing bars were closed, although most of them were for less than 100 tons.

Evidences of further stiffening price tendencies are apparent. Coke prices have been advanced 50c. to $1, and pig iron is somewhat firmer. English ferromanganese was advanced in price $5., making the present quotation, $112.50, duty paid, San Francisco.

Both buyers and sellers of iron and steel in this market expect a stronger demand during the first six months of 1925, at firmer prices. For that reason, many buyers have already covered, as far as possible, for their first quarter requirements. There is also a feeling, expressed in several places, that there is likely to be a shortage of steel during the coming year. However, substantial confidence is shown by both buyers and sellers and the outlook for 1925 is regarded as encouraging.

Pig Iron.—Strengthening price tendencies for domestic iron continue. Present quotations are very firm and another upward price movement is not considered unlikely in the near future. The amount of foreign iron available at present is small, although a shipment involving several hundred tons of English foundry iron and coke arrived at this port during the past week. A very low quotation for 500 to 1000 tons of Indian iron, in reply to a request for bids, was made in Los Angeles last week the figure quoted being about $22.75, duty paid. There is very little Indian iron available, and European irons are not plentiful. It is doubtful whether any large tonnages could be filled with foreign iron. Current quotations are as follows:

Utah basic, delivered San Francisco	$27.25 to $28.25
Utah foundry, sil. 1.75 to 2.25, delivered	27.50 to 28.50
*Scotch foundry	30.00 to 32.00
*English foundry	28.50 to 30.00
*Belgium foundry	26.00 to 28.00
*Indian foundry	26.00 to 28.00
Birmingham, Ala., foundry, sil. 2.75 to 3.25, delivered, San Francisco	31.00

*Duty paid, f.o.b. cars San Francisco.

Ferroalloys.—An advance of $5 a ton was made in the price of English ferromanganese. Sellers are now quoting $112.50 duty paid. Swedish ferrosilicon is firm at $88, duty paid.

Plates.—Awards of the week totaled about 3000 tons, and several large projects are pending. Plates are firm at 2.45c. to 2.50c., c.i.f. Awards included: City of Tacoma Pipe Line, 100 tons to Willamette Iron & Steel Co.; Haveside Co., 400 tons of plates and shapes for steel derrick barge to Pacific Coast Engineering Co.; Union Oil Co., tanker, 350 tons, Moore Dry Dock Co.; Pacific Gas & Electric Co., plates for gas generators, 350 tons, to Moore Dry Dock Co.; U. S. Engineers, San Francisco, 175 tons, pipe line, to Pacific Coast Engineering Co.

Shapes.—Several large jobs are pending, but no awards of any size were made during the past week. Judson Mfg. Co. got 200 tons for the General Petroleum Co. plant in Oakland. Prices are firm at 2.45c., base, c.i.f.

Sheets.—Buyers are fairly well covered for the first quarter. Prices are firm, quotations being as follows: Blue annealed, 3.43c., base, c.i.f.; black, 4.33c., base, c.i.f.; galvanized, 5.48c., base, c.i.f.

Cast Iron Pipe.—Bids have been called for by the Bureau of Water Works, Portland, Ore., Frank Coffinberry, purchasing agent, for 3500 tons of cast iron

water pipe and 50 tons of cast iron specials. Bids close Jan. 5.

Bars.—Activity during the past week was somewhat limited. Soft steel bars are 2.55c. to 2.60c., carload, and $3 base, warehouse, l.c.l. Soft steel bands are $3.75 base, warehouse, l.c.l. Reinforcing bars are firm at 3.35c., base, carload, and 3.80c., l.c.l. Awards for reinforcing steel during the week amounted to about 400 tons, only two jobs, however, called for 100 tons or more—the First Congregational Church, Berkeley, 150 tons, went to the Steel Service Corporation, and the Alco Knitting Co., factory job, San Francisco, 100 tons was awarded Edw. L. Soule & Co. The Pacific Coast Steel Co. got 170 tons. Eagle's Temple, Ballard, Wash.

Coke.—Price advances of from 50c. to $1. have been made in domestic coke. No large amount of business is being transacted at present. Birmingham, Ala., by-product coke is quoted at $18.50 to $20.50, delivered. West Virginia, beehive is $28 delivered, Wise County, Va., beehive, is $22, and English beehive is being offered at $16. English, by-product is about $14, in San Francisco.

Cincinnati

Pig Iron Buying Confined Largely to Basic—Southern Market Strong

CINCINNATI, Dec. 29.—The market generally was quiet during the past week and there is little inquiry current. It is expected that there will be little interest manifested until after the turn of the year. A steel works interest bought 5000 tons of basic iron from a Valley furnace at a price undisclosed. A sale of 500 tons of basic was reported at $22, Lake furnace. The Norfolk & Western Railroad closed for 1200 tons of foundry with a southern Ohio furnace at $22.50, base. A furnace manufacturer bought 600 tons of Southern foundry for second quarter shipment at $20, Birmingham. Small sales of Southern iron are being made by one company at $20.50. The market generally is strong and advances in both southern Ohio and Birmingham districts are expected within the next week or two. Belfont furnace at Ironton blew in Dec. 23 and Norton furnace at Ashland is scheduled to go in this week.

Based on freight rates of $4.05 from Birmingham and $2.27 from Ironton we quote f.o.b. Cincinnati:

Southern fdy., sil. 1.75 to 2.25 (base)	$24.05
Southern fdy., sil. 2.25 to 2.75	24.55
Southern Ohio silvery, 8 per cent	$31.77 to 32.77
Southern Ohio fdy., sil. 1.75 to 2.25	24.27 to 24.77
Southern Ohio, basic	23.77
Southern Ohio, malleable	24.27 to 24.77

Sheets.—While current orders are light, need for sheets is shown by the number of requests for immediate shipment of January quotas on first quarter contracts. Prices are steady at 2.70c. for blue annealed, 3.60c. for black and 4.75c. for galvanized, all f.o.b. Pittsburgh.

Structural Activity.—New inquiries are lacking, but a number of awards are expected this week requiring approximately 4000 tons of shapes.

Reinforcing Bars.—Demand is for small tonnages, no new projects of importance having come out. Prices are steady at 1.95c., mill, for rail steel bars, to 2.10c., Pittsburgh, for new steel.

Warehouse Business.—The customary holiday lull is apparent, and sales have been confined to small lots. Prices are steady and unchanged.

Finished Materials.—Buying of finished materials has been light for the past 10 days, but specifications have been coming in in good volume, with instructions to ship materials as soon as possible, indicating a depleted condition of stocks. Tank builders and gas holder manufacturers report a large volume of inquiry, and this will mean much plate business later on. There is a fair amount of structural activity in prospect, and demand for bars is expected to become heavy after Jan. 1. Prices of bars and shapes are quoted at 2c. to 2.10c., Pittsburgh, depending on size and attractiveness of the order, and on plates a range of 1.90c. to 2c. is being quoted. Wire products are inactive, though prices are steady at 2.60c. for plain wire and 2.85c. for wire nails. Specifications for first quarter are being received for bolts and nuts, but current demand is light. There is no demand of consequence for light rails, and prices are nominally quoted at 1.80c. to 1.90c., Pittsburgh.

Cincinnati jobbers quote: Iron and steel bars, 3.30c.; reinforcing bars, 3.30c.; hoops, 4.35c.; bands, 3.95c.; shapes, 3.40c.; plates, 3.40c.; cold-rolled rounds, 4.05c.; cold-rolled flats, squares and hexagons, 4.55c.; open-hearth spring steel, 4.75c. to 5.75c.; No. 10 blue annealed sheets, 3.90c.; No. 28 black sheets, 4.60c.; No. 28 galvanized sheets, 5.75c.; No. 9 annealed wire, $3.15 per 100 lb.; common wire nails, $3.15 per keg base; cement coated nails, $2.85 per keg.

Coke.—There is little activtiy in furnace and foundry grades of coke, most melters being fairly well taken care of. Domestic grades are active as a result of cold weather. Prices in all districts are steady. Connellsville furnace ranges from $3.75 to $4.50; foundry from $4.50 to $5.50. New River foundry is quoted at $8.50, Wise County furnace $4 to $5, and foundry $4.50 to $6. By-product foundry, $6.50, Connellsville basis.

Old Material.—Consumers of old materials are bidding for supplies, but dealers are holding for higher prices and as a result actual sales are light. Dealers with short orders are having extreme difficulty in securing materials to fill contracts, and prices of some grades are higher. It is almost impossible to secure malleable grades at any price.

We quote dealers' buying prices, f.o.b. cars, Cincinnati:

Per Gross Ton

Heavy melting steel	$16.50 to $17.00
Scrap rails for melting	16.00 to 16.50
Short rails	20.00 to 20.50
Relaying rails	31.00 to 31.50
Rails for rolling	18.00 to 18.50
Old car wheels	15.50 to 16.00
No. 1 locomotive tires	18.50 to 19.00
Railroad malleable	18.50 to 19.00
Agricultural malleable	17.50 to 18.00
Loose sheet clippings	13.50 to 14.00
Champion bundled sheets	14.50 to 15.00

Per Net Ton

Cast iron borings	13.00 to 13.50
Machine shop turnings	11.50 to 12.00
No. 1 machinery cast	19.00 to 19.50
No. 1 railroad cast	17.00 to 17.50
Iron axles	23.50 to 24.00
No. 1 railroad wrought	14.00 to 14.50
Pipes and flues	10.50 to 11.00
No. 1 busheling	12.50 to 13.00
Mixed busheling	10.00 to 10.50
Burnt cast	12.50 to 13.00
Stove plate	12.50 to 13.00
Brake shoes	14.00 to 14.50

Detroit Scrap Prices Higher

DETROIT, Dec. 29.—Some further advances on old material have been registered during the past week, notably on heavy melting and shoveling steel, sheet clippings, flashings and hydraulic compressed. Dealers generally are holding their yard stocks in anticipation of activity after Jan. 1.

The following prices are quoted on a gross ton basis f.o.b. producers' yards, excepting stove plate, No. 1 machinery cast and automobile cast, which are quoted on a net ton basis:

Heavy melting steel	$17.50 to $18.00
Shoveling steel	17.50 to 18.00
Borings	14.00 to 14.50
Short turnings	14.00 to 14.50
Long turnings	13.50 to 14.00
No. 1 machinery cast	18.00 to 18.50
Automobile cast	18.50 to 19.50
Hydraulic compressed	17.00 to 17.50
Stove plate	15.00 to 16.00
No. 1 busheling	14.50 to 15.00
Sheet clippings	12.00 to 13.00
Flashings	13.00 to 14.00

The Cruse-Kemper Co., engineer and contractor, Ambler, Pa., recently booked gas holders as follows: Point Breeze, Philadelphia, 400 tons; Havana, Cuba, 200 tons; New Britain, Conn., 1250 tons; Birmingham, Ala., 2500 tons.

Cleveland

Mills Well Supplied with Orders and Prospects Are Favorable

CLEVELAND, Dec. 29.—The new year will start with most mills comfortably filled with first quarter business and the outlook for the year most promising. Some of the mills are still booking a good volume of new business, although there has been a slowing down of specifications during the holiday season. The implement manufacturers are buying freely and good orders for steel bars also came during the week from manufacturers of reinforcing bars. Some consumers who had already made purchases have come into the market again for additional steel to cover their first quarter's requirements. None of the buying is regarded as of a speculative character. Most consumers have good specifications on mill books for January delivery. Detroit has taken bids for a riveted steel pipe line requiring 8000 tons of plates. The St. Louis pipe line previously reported as requiring 8000 tons of plates will take 14,000 tons, according to late reports. The Pennsylvania Railroad has placed 3700 tons of structural steel for bridge work and the Euclid Avenue Baptist Church, Cleveland, has placed 1000 tons for a new building.

Pig iron prices are somewhat firmer. Plates have stiffened, but other finished steel prices are unchanged.

Pig Iron.—Prices still show an upward tendency because of the higher production costs due to higher coke prices. However, the changes in the past week have been the marking up of quotations by some of the furnaces, though they were on the lower price levels and no producers are asking above $23 for foundry and malleable iron, which price was being quoted by some makers a week ago. The Cleveland price is unchanged at $23 at furnace and that price is now being generally quoted by other Lake furnaces. In the Valley district the market is up about 50c., with a price range of $22.50 to $23. With a holiday lull, sales have been rather light. One producer booked 10,000 tons, but this included 8000 tons on term contracts. A fair volume of inquiry is coming out, mostly for the second quarter. While there is some talk of $25 iron, conservative producers seem inclined to avoid making further advances, fearing that any higher prices will check the second quarter buying movement. Inquiries include one for 1400 tons of malleable iron from a northern Ohio foundry. Basic iron is inactive, but on this grade $22 is now regarded as the minimum price. Ohio silvery iron has stiffened to the regular schedule of $30.50 for 8 per cent.

Quotations below, except on basic and low phosphorus iron, are delivered Cleveland, and for local iron include a 50c. switching charge. Ohio silvery and Southern iron prices are based on a $3.02 freight rate from Jackson and $6 rate from Birmingham:

Basic, Valley furnace	$22.00
N'th'n No. 2 fdy., sil. 1.75 to 2.25	23.50
Southern fdy., sil. 1.75 to 2.25	26.01 to 26.51
Malleable	23.50
Ohio silvery, 8 per cent	33.52
Stand. low phos., Valley furnace	28.50 to 29.00

Bolts, Nuts and Rivets.—Bolt and nut makers are getting a good volume of contracts at the recently adopted delivered prices. Specifications on fourth quarter contracts are heavy as consumers want the benefit of the lower prices that prevailed when these contracts were placed. Rivet manufacturers are closing up many first quarter contracts at the 2.60c. price for large rivets which appears firm.

Sheets.—New demand is light. Prices are being maintained for future delivery, but black sheets are still available at 3.50c. for early shipment. Light plates in blue annealed gages are quoted at 2.60c. or $2 a ton below the regular blue annealed base.

Reinforcing Bars.—Reinforcing bars are quiet, with prices on rail steel bars firmer. While these are commonly quoted at 1.90c. a round lot might bring out a 1.85c. price.

Semi-Finished Steel.—The supply of semi-finished steel is scarce and prices are very firm, but there is not much demand, as most consumers are under contract for the first quarter. A local mill recently advanced its price to $40, Cleveland, for sheet bars, billets and slabs, and sold 2000 tons of sheet bars at that price during the week for the first quarter. Youngstown mills are asking the same price, although recent sales of considerable tonnage are reported at $39, Youngstown. Slabs are being offered for Cleveland delivery at $37, Pittsburgh, which makes the delivered price practically the same as the price quoted by a local mill.

Steel Bars, Plates and Structural Material.—The plate market has stiffened to a minimum of 2c., which is well established as a price and one large independent mill is asking 2.10c. Steel bars and structural material are firm at 2c.

Jobbers quote steel bars, 3.10c.; plates and structural shapes, 3.20c.; No. 28 black sheets, 4.35c.; No. 28 galvanized sheets, 5.45c.; No. 10 blue annealed sheets, 3.45c. to 3.60c.; cold-rolled rounds, 4c.; flats, squares and hexagons, 4.50c.; hoops and bands, 1 in. and wider and 20 gage and heavier, 3.85c.; narrower than 1 in., all gages, 4.35c.; No. 9 annealed wire, $3.15 per 100 lb.; No. 9 galvanized wire, $3.60 per 100 lb.; common wire nails, $3.25 base per 100 lb.

Coke.—With the stiffening of foundry coke prices following the recent wage advance the usual range of prices on standard Connellsville foundry coke is $5.25 to $5.50 for prompt shipment and contract, but some producers are now declining to quote.

Old Material.—Heavy melting steel scrap and several other grades have again advanced from 25c. to 75c. a ton and the market is very firm but dull. Dealers are asking more for scrap than mills seem willing to pay and consumers have shown little interest in the market the past week for as a rule they have not cared to make additional purchases before January and most mills appear to be well covered up to about February.

We quote dealers' prices f.o.b. Cleveland per gross ton:

Heavy melting steel	$19.50 to $19.75
Rails for rolling	19.50 to 19.75
Rails under 3 ft.	21.50 to 22.00
Low phosphorus melting	21.50 to 22.00
Cast iron borings	16.00 to 16.25
Machine shop turnings	16.00 to 16.25
Mixed borings and short turnings	16.00 to 16.50
Compressed sheet steel	16.50 to 17.00
Railroad wrought	16.50 to 17.00
Railroad malleable	19.75 to 20.00
Light bundled sheet stampings	14.00 to 14.25
Steel axle turnings	16.50 to 17.00
No. 1 cast	20.00 to 20.50
No. 1 busheling	15.75 to 16.25
Drop forge flashings	15.00 to 15.50
Railroad grate bars	16.00 to 16.25
Stove plate	16.00 to 16.25
Pipes and flues	14.25 to 14.50

Philadelphia

Pig Iron Advance Expected—Heavy Specifying of Finished Products

PHILADELPHIA, Dec. 29.—New business is about at a standstill during the holidays and inventory taking, but considerable activity is felt by the steel mills as consumers, protected at lower prices until the end of December, specify rather heavily in certain cases. Bar mills are generally booked ahead for the next month to six weeks and most sheet mills are working on comfortable backlogs of blue annealed. Tin plate bookings have been heavy for the first half. Plate makers as a result of the recent activity of the railroads in car and locomotive purchasing and the development of a mild demand from oil companies are facing the coming quarter with firmer prices than for many months. A large part of the tonnage of most products now on the books is at prices in some instances considerably lower than the current market, but as Dec. 31 marks the ending, as a rule, of price protection at the lower quotations, sellers look forward to a firm market in January.

Interest in pig iron is at a low ebb as the year draws to a close, but prices are firm with the expectation of a

further advance in quotations soon after Jan. 1, to offset the increased cost of coke.

Pig Iron.—Transactions are almost exclusively in small lots of a few carloads or specifications against fourth quarter contracts. While $23.50 per ton is still quotable on foundry iron in the absence of actual business to establish a higher price, $24 is being adhered to as a base by several furnace interests. Basic is also unchanged as a result of the lack of business, but sellers are firm in their prices and in several cases are unwilling to quote less than $24 at the furnace. There are rumors that a tonnage of basic is being imported by one seller, but no information as to the c.i.f. price is available.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia and include freight rates varying from 76c. to $1.63 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$24.26 to $25.13
East. Pa. No. 2X, 2.25 to 2.75 sil.	25.01 to 25.88
East. Pa. No. 1X	26.01 to 26.88
Virginia No. 2 plain, 1.75 to 2.25 sil.	29.17 to 29.67
Virginia No. 2X, 2.25 to 2.75 sil.	29.67 to 30.17
Basic delivered eastern Pa.	23.50 to 24.50
Gray forge	23.50 to 24.00
Malleable	24.50 to 25.00
Standard low phos. (f.o.b. furnace)	25.50 to 26.50
Copper bearing low phos. (f.o.b. furnace)	25.50 to 26.00

Billets.—With producers taking more of their output for use in their own finishing mills, tonnages available for the open market are expected to diminish rapidly with an accompanying firmness of quotations. Rerolling billets are now fairly firm at $37 per ton, Pittsburgh, for first quarter with $37.50 quoted in some cases. Forging billets range from $42 to $42.50 per ton, Pittsburgh.

Bars.—Purchasing covers almost the entire field of consuming industries, as users hasten to cover on whatever quotations have been made to them at less than the current market. Prices are firm at 2.10c. per lb., Pittsburgh, and with mills booked for the next 30 to 60 days with a comfortable backlog of orders there is evidently no prospect of an early inclination to shade. Iron bars are showing greater strength and are now being quoted at 2.25c. per lb., f.o.b. mill, or 2.38c. per lb., Philadelphia, equivalent to about 2.06c. per lb., Pittsburgh.

Shapes.—In the absence of any volume of substantial structural projects in this district, fabricators, protected at lower than current quotations, are in most cases specifying for stock. Prices are firm at 2c. per lb., Pittsburgh, with 2.10c. per lb. quoted by some sellers. About 2700 tons of shapes is included in a recent inquiry of the Norfolk & Western Railway for materials for 1600 cars.

Warehouse Business.—Although purchasing from stock has not as yet developed to even moderate proportions, jobbers have been active in the past week to 10 days in specifying against contracts and filling out stocks at as low prices as possible. An advance was made in the past week on cold rolled shafting of $2 per ton to 4.15c. per lb. for rounds and 4.65c. per lb. for squares, flats and hexagons.

Soft steel bars and small shapes, 3.20c.; iron bars (except bands), 3.20c.; round edge iron, 3.50c.; round edge steel, iron finished, 1½ x ½ in., 3.50c.; round edge steel planished, 4.30c.; tank steel plates, ¼ in. and heavier, 3.10c.; tank steel plates, ⅜ in., 3.25c.; blue annealed steel sheets, No. 10 gage, 3.75c.; black sheets, No. 28 gage, 4.35c.; galvanized sheets, No. 28 gage, 6c.; square twisted and deformed steel bars, 2.85c.; structural shapes, 3.10c.; diamond pattern plates, ¼-in., 5.20c.; ⅜-in., 5.50c.; spring steel, 5c.; round cold-rolled steel, 4.15c.; squares and hexagons, cold-rolled steel, 4.65c.; steel hoops, 1 in. and wider, No. 20 gage and heavier, 3.95c.; narrower than 1 in., all gages, 4.45c.; steel bands, No. 12 gage to ⅜ in., inclusive, 3.95c.; rails, 3.20c.; tool steel, 8.50c.; Norway iron, 7c.

Plates.—Railroad demand for cars and locomotives shows no signs of cessation and the recent improvement in the volume of inquiries from oil companies for tank work seems to promise continued increase. The recent inquiry of the Norfolk & Western Railway in addition to the shapes included about 6900 tons of plates and several hundred tons of bars. Plate consumers, protected at the recent prevailing low prices until Dec. 31, are reported to have been particularly active in specifying for prompt shipment. Makers are today firm at 2c. per lb., Pittsburgh, with 2.10c. quoted in some instances.

Ferromanganese.—Consumers are evidently well covered for first quarter, demand being confined to small lots. Quotations continue unchanged at $110 per ton, seaboard or domestic furnace.

Old Material.—Little new business has developed, but prices are strong on all grades and heavy melting steel is firm at $21 per ton, delivered. A large eastern Pennsylvania consumer, not in the market for some time, is expected to contract soon after the first of the year. Forge fire is firm at $17.50 to $18, the latter price having been paid by one eastern Pennsylvania consumer. Borings and turnings cover a still wider range of quotations at $13.50 to $15.50 per ton, the former price being for delivery to Bethlehem, and the latter delivered to Birdsboro. Railroad grate bars have advanced $1 a ton, a fair quotation for the market being $17 to $18 per ton. Thus far there is no evident decline in the upward movement of the entire market.

We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$21.00
Scrap rails	20.00 to 21.00
Steel rails for rolling	20.00 to 21.00
No. 1 low phos., heavy 0.04 and under	24.00 to 25.00
Couplers and knuckles	23.50 to 23.50
Rolled steel wheels	23.50 to 23.50
Cast-iron car wheels	19.50 to 20.00
No. 1 railroad wrought	21.00 to 22.00
No. 1 yard wrought	18.00 to 19.00
No. 1 forge fire	17.50 to 18.00
Bundled sheets (for steel works)	17.00 to 17.50
Mixed borings and turnings (for blast furnace use)	13.50 to 15.50
Machine shop turnings (for steel works use)	17.00 to 17.50
Machine shop turnings (for rolling mill use)	17.00 to 17.50
Heavy axle turnings (or equivalent)	18.00 to 18.50
Cast borings (for steel works and rolling mills)	15.50 to 16.00
Cast borings (for chemical plants)	21.00 to 22.00
No. 1 cast	20.50 to 21.00
Heavy breakable cast (for steel plants)	18.50 to 19.00
Railroad grate bars	17.00 to 18.00
Stove plate (for steel plant use)	16.50 to 17.00
Wrought iron and soft steel pipes and tubes (new specifications)	18.00 to 18.50
Shafting	25.00 to 26.00
Steel axles	25.00 to 26.00

Imports.—In the week ended Dec. 27 a total of 5020 tons of pig iron was received from the United Kingdom and 7531 tons of iron ore from Spain.

Puddlers' Wages Reduced

YOUNGSTOWN, Dec. 29.—Tonnage rates paid puddlers and bar iron finishers in mills which are members of the Western Bar Iron Association subscribing to the sliding scale wage agreement, declined 2 per cent, for the January-February period, as a result of the bimonthly examination of sales sheets today. The average selling price of bar iron shipped from midwestern mills during 60 days ending Dec. 20 was 2.05c. per lb., as disclosed by the examination, a decline from 2.10c., the average two months before. The new puddling rate is $11.63 per ton, a decline from $11.88, the rate paid in November and December. Conditions in the iron market indicate that the price decline, which was steady for nine months, has been checked.

Tokio City Office, Tokio, Japan, plans to construct a large steam-driven electric power generating station to replace the two stations at Shibuya and Shinagawa of the Tokio Municipality, both of which were destroyed by the earthquake in 1923. Equipment in the new station will consist of two 5000-kv. ampere turbo-generators, together with the necessary boilers, condensers and auxiliary power plant equipment. The cost is estimated at 1,500,000 yens ($570,000). Construction will proceed under the direction of Mr. Tojo, Kinugawa Hydroelectric Co., Tokio, as soon as a suitable location is secured.

FABRICATED STEEL BUSINESS

Large Tonnage Awarded but New Projects Light —Pittsburgh Bridges Take 18,000 Tons

While new projects registered a decline the past week, dropping from 59,000 tons reported in the previous week to 9800 tons, awards last week totaled 51,000 tons. The outstanding award covered bridges in Pittsburgh taking 18,000 tons. Among other sizable awards are the Columbia-Presbyterian Hospital, New York, and a loft building at Thirty-fifth Street and Madison Avenue, New York, each about 8000 tons. The awards include the following:

Columbia-Presbyterian Hospital, New York, 8000 tons, to American Bridge Co.

Loft building, Thirty-fifth Street and Madison Avenue, New York, 8000 tons, to Levering & Garrigues Co.

Baltimore & Ohio Railroad, bridges, 1000 tons to American Bridge Co., 900 tons to Bethlehem Steel Co. and 200 tons to Fort Pitt Bridge Works.

St. Joseph Hospital, Reading, Pa., 250 tons, to McClintic-Marshall Co.

Atlantic Coast Line, bridge, 300 tons, to unnamed fabricator.

Glen Olden, Pa., power house, 1300 tons, to Fort Pitt Bridge Works.

City of Pittsburgh, Sixth, Seventh and Ninth Street bridges, 18,000 tons, to American Bridge Co.

Grand Haven Gas Co., Grand Haven, Mich., gas holder, 300 tons, to Stacey Mfg. Co.

Petoskey & Bay Shore Gas Co., Petoskey, Mich., gas holder, 150 tons, to Stacey Mfg. Co.

New York Central Lines, bridge work, 100 tons, to Mount Vernon Bridge Co.

Knights of Columbus building, Columbus, Ohio, 550 tons, Middle States Construction Co. low bidder.

Continental Gin Co., Birmingham, 650 tons, to International Steel & Iron Co.

General Petroleum Co., Oakland, Cal., plant, 200 tons, to Judson Mfg. Co.

City of Tacoma, Wash., pipe line, 100 tons, to Willamette Iron & Steel Co.

Haveside Co., San Francisco, steel derrick and barge, 400 tons, to Pacific Coast Engineering Co.

City of El Centro, Cal., 250,000-gal. water tank, 100 tons, to Chicago Bridge & Iron Co.

Union Oil Co., tanker, 350 tons, to Moore Dry Dock Co.

Pacific Gas & Electric Co., San Francisco, gas generators, 350 tons, to Moore Dry Dock Co.

U. S. Engineers' Office, San Francisco, pipe line, 175 tons, to Pacific Coast Engineering Co.

Euclid Avenue Baptist Church, Cleveland, church and office building, 1000 tons, to McMyler Interstate Co.

Pennsylvania Railroad, bridge over Beaver River, 3700 tons, to Mount Vernon Bridge Co.

Thistle-Down Jockey Club, Cleveland, grandstand, 310 tons, to National Iron & Wire Co.

Union Electric Light & Power Co., Cahokia power plant, East St. Louis, Ill., 2400 tons to Fort Pitt Bridge Works.

Store and office building, corner of Seventh and Main Streets, Los Angeles, 1600 tons, to Baker Iron Works.

Acme Steel Goods Co., Riverdale, Ill., band mill, 700 tons, to McClintic-Marshall Co.

Charter Gas Engine Co., Sterling, Ill., machine shop, 162 tons, to Milwaukee Structural Steel Co.

Northern Pacific Railway, two 100-ft. turntables, Helena, Mont., and Auburn, Wash., 149 tons, to American Bridge Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

Public School No. 116, Manhattan, 1100 tons, bids to be opened Dec. 29.

Public School No. 195, Brooklyn, 1000 tons, bids opened Jan. 6.

First National Bank, Utica, N. Y., 1700 tons, bids in.

Pennsylvania Railroad, bridge at Greensburg, Pa., 200 tons.

Stone Baking Co., Atlanta, Ga., 600 tons.

Pennsylvania Railroad, bridge, 400 tons.

Bangor & Aroostook Railroad, two bridges, 400 tons.

Baltimore & Ohio Railroad, bridge, 200 tons.

Eagles' Temple, Seattle, Wash., 100 tons.

Scranton Dry Goods Co., Scranton, Pa., store building, 800 tons.

Chicago, Burlington & Quincy, bridge work, 1500 tons.

Illinois Women's Athletic Club, Chicago, 3500 tons, figures to be taken in January.

RAILROAD EQUIPMENT BUYING

Car Purchases Increase and Inquiries Double— Two Roads Increase Locomotive Orders

Orders for 3050 cars were placed in the week. Inquiries covered 1655. The principal car purchasers were the Missouri Pacific which closed on 1000 and the Louisville & Nashville, also the buyer of 1000. The latter railroad placed 16 additional locomotives and the Central Railroad of New Jersey doubled a recent order for 10 locomotives.

The Great Northern Railway is asking for prices on 4 gas-electric baggage cars; 4 direct gasoline driven baggage cars; 4 complete sets of trucks with gasoline power plants for application to existing baggage cars.

The Phillips Petroleum Co. is inquiring for 75 tank cars.

The Chicago, Indianapolis & Louisville is in the market for 500 box cars.

The Louisville & Nashville, which recently closed on 1000 box cars with the Pressed Steel Car Co. and 24 locomotives with the American Locomotive Co., has awarded an additional 1000 cars and 16 more locomotives to the same companies.

The Chicago, Burlington & Quincy is in the market for 500 50-ton gondola cars.

The Central Railroad of New Jersey, which recently ordered 10 Mikado type locomotives from the Baldwin Locomotive Works, has awarded 10 more to the same company.

The Akron, Canton & Youngstown is in the market for 2 0-8-0 switching locomotives.

The Oregon American Lumber Co. has purchased a Prairie type locomotive from the Baldwin Locomotive Works.

The Insular Lumber Co., Philippine Islands, has purchased one Mallet type locomotive from the Baldwin Locomotive Works.

The New York Central has awarded conversion of 200 box cars into stock cars and conversion of 200 box cars into flat cars to the Illinois Car & Mfg. Co.

The Seaboard Air Line is asking for figures on rebuilding 1000 box cars and plans to buy 80 new caboose cars.

The Missouri Pacific has placed 1000 cars distributed as follows: 375 gondola cars each to the Pennsylvania Tank Car Co. and the Pullman Car & Mfg. Corporation, and 250 hopper cars to the Standard Steel Car Co.

The Northern Pacific has ordered 500 box cars from the Pacific Car Co., 500 box cars from the Pullman Car & Mfg. Corporation and is inquiring for 500 box car underframes and 10 caboose car underframes.

The Monon is inquiring for 500 box cars.

The Florida East Coast has placed 500 caboose cars with the Magor Car Co.

The Lehigh & New England has awarded the conversion of 200 gondola cars into box cars to the Pressed Steel Car Co.

Golden Gate Bridge Plans Approved

SAN FRANCISCO, Dec. 29.—Secretary of War Weeks has officially approved for the War Department the proposed bridge across the Golden Gate to connect San Francisco and San Mateo County. Work on the construction of the bridge will start as soon as the initial financial arrangements have been made. The engineering plan calls for a bridge having a main span 4000 ft., 210 ft. above the water, between two 1010-ft. piers. The approaches to the piers on either shore will total 2640 ft., making the total length of the proposed bridge 6640 ft., or 1 1/6 miles. Specifications call for a width of 80 ft., and provide for two lines of trolley cars, two roadways in each direction and two 7 ft. sidewalks.

The amount of steel estimated as necessary in the construction totals approximately 75,000 tons, exclusive of 5000 tons of cable. More than 120,000 tons of cement is also included in the estimate. The movement to bridge the Golden Gate started at a mass meeting at Santa Rosa, Cal., Jan. 13, 1923. J. B. Strauss, bridge engineer of Chicago, drew the plans submitted to the War Department, and he will have charge of the construction.

NON-FERROUS METALS

The Week's Prices

Cents per Pound for Early Delivery

	Copper, New York		Straits Tin (Spot)	Lead		Zinc	
Dec.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
23.....	14.87½	14.50	57.50	10.10	9.80	8.05	7.70
24.....	15.00	14.50	57.75	10.10	9.80	8.05	7.70
26.....	15.00	14.62½	58.12½	10.15	9.80	8.05	7.70
27.....	15.00	14.62½	....	10.15	9.80	8.05	7.70
29.....	15.00	14.62½	59.00	10.15	9.80	8.15	7.80

*Refinery quotation; delivered price ¼c. higher.

New York

NEW YORK, Dec. 29.

The year draws to an end with most of the metals at the highest point for the year and in some cases higher than in 1923. The steady advance in copper continues. Prices of tin are higher in a moderately active market. Lead continues its upward course with the scarcity intensified. Again zinc has recorded a new high price. Even antimony has excelled all recent records.

Copper.—The steady and orderly advance in electrolytic copper has continued until the long-looked-for 15c. level has virtually arrived. It has come earlier than some believed possible only a month ago. Most producers today are quoting 15c., delivered, but it is not understood that this price has been actually recorded in sales. There is still some metal available at 14.87½c., delivered. Inquiries and sales are only moderate as the week starts, but consumers are reported as interested in further large purchases. Buying for export is also satisfactory. Lake copper is quoted at 15c., delivered.

Tin.—The market is quiet but very strong. Sales for the week ended with Saturday, Dec. 27, totaled 500 to 600 tons, mostly to one consumer. Today about 200 to 300 tons changed hands, with consumers being the principal buyers and with futures the principal position involved. The range of prices was 58.75c. to 58.87½c. Spot was quoted and sold today at 59c., New York, with few sellers making any offerings. The London market today was about £6 per ton higher than a week ago, with spot standard quoted £271 10s., future standard at £274 15s. and spot Straits at £274 10s. Sales of spot standard today were 200 tons and future standard 990 tons. The Singapore market today was quoted at £276 15s., wtih 625 tons sold. Arrivals thus far this month have been 3880 tons, with 8450 tons reported afloat.

Lead.—Prices continue to rise in a market where a supply is very difficult to obtain. In the last week the leading interest has advanced its price twice to 9.50c. on Dec. 23 and to 9.60c., New York, on Dec. 26. Sales in the outside market, the few that have been made, have been done at an average of about 10.15c., New York, or 9.80c., St. Louis, though reliable quotations are difficult to arrive at. These values are the highest that have been recorded this year, and it is necessary to go back to May, 1917, to find higher ones.

Zinc.—London prices, the first since Dec. 24, being higher today, new strength was instilled into the market and a new top for the year was recorded. Prime Western zinc is quoted for early delivery at 7.80c. to 7.85c., St. Louis, or 8.15c. to 8.20c., New York. Sales and inquiries continue in sufficient volume to sustain the strength of the market.

Nickel.—Wholesale lots of shot and ingot nickel are quoted unchanged at 29c. to 30c. per lb., with electrolytic nickel at 33c.

Antimony.—Due to increased demand and to the fact that the metal is in strong hands, Chinese antimony is quoted and has been sold today at 17.50c., New York, duty paid, the highest price in many months.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 27c. to 28c., delivered.

Old Metals.—The market is very firm, notwithstanding a little slacking off in activity over the holidays. Dealers' selling prices are as follows in cents per lb.:

Copper, heavy and crucible	$14.00
Copper, heavy and wire	13.25
Copper, light and bottoms	11.75
Heavy machine composition	10.75
Brass, heavy	9.25
Brass, light	7.75
No. 1 red brass or composition turnings	9.50
No. 1 yellow rod brass turnings	9.25
Lead, heavy	9.00
Lead, tea	8.00
Zinc	4.75
Cast aluminum	17.50
Sheet aluminum	17.50

Chicago

CHICAGO, Dec. 29.—Copper, tin, antimony and zinc have advanced on a buying movement which has largely ignored the holidays. Aggregate business in copper has been heavy. Tin buying has been liberal, although largely confined to dealers. Among the old metals, grades of copper, brass, lead and tin have advanced. We quote, in carload lots: Lake copper, 15.25c.; tin, 59.50c.; lead, 10.25c.; spelter, 7.90c.; in less than carload lots, antimony, 18c. On old metals we quote copper wire, crucible shapes and copper clips, 12c.; copper bottoms, 10.25c.; red brass, 9.50c.; yellow brass, 8.25c.; lead pipe, 8.25c.; zinc, 4.87½c.; pewter, No. 1, 28c.; tin foil, 40c.; block tin, 45c.; all buying prices for less than carload lots.

Lake Superior Ore Shipments by Grades and Ranges

Shipments of Lake Superior ore by grades and ranges in 1924 are shown in a report just issued by the Lake Superior Iron Ore Association. The figures cover water shipments only, and bill of lading weights are used, which are 1 per cent less than the actual weights. Consequently the grand total of shipments in this report appear as 42,197,337 tons, as compared with actual shipments of 42,623,572 tons.

Shipments by grades were: Bessemer, 12,113,693 tons; non-Bessemer, 27,801,241 tons; manganiferous, 1,355,458 tons; silicious, 926,957 tons.

Shipments from the various ranges and from grades were as follows:

Mesabi Range — Non-Bessemer, 20,036,060 tons; Bessemer, 8,462,706 tons; manganiferous, 24,988 tons; silicious, 14,154 tons; total, 28,537,908 tons.

Menominee Range—Non-Bessemer, 3,245,676 tons; Bessemer, 231,378 tons; manganiferous, 198,963 tons; silicious, 111,310 tons; total, 3,787,327 tons.

Cuyuna Range—Manganiferous, 659,108 tons; non-Bessemer, 623,021 tons; total, 1,282,129 tons.

Gogebic Range—Bessemer, 2,413,180 tons. non-Bessemer, 1,814,448 tons; manganiferous, 472,399 tons; silicious, 59,469 tons; total, 4,759,496 tons.

Vermilion Range—Bessemer, 865,417 tons; non-Bessemer, 58,798 tons. total, 924,215 tons.

Marquette Range—Non-Bessemer, 2,023,238 tons; silicious, 742,024 tons; Bessemer, 141,012 tons; total, 2,906,274 tons.

The State Railroad Commission, Texas, has set Feb. 10 for hearings in connection with a proposed amendment to the plan for adjustment of rates on reinforcing steel and bar iron, as proposed by the Texas Steel Co., Fort Worth. It provides for a maximum rate of 22c. per 100 lb. on carload shipments from Fort Worth to destinations in the Texas common-point territory; a maximum rate of 30c. to El Paso, and 18c. to Houston. These proposed rates are to be subject to transit privileges now applicable to this class of traffic, for the purpose of being fabricated in transit. Rates to differential territory points, except El Paso, are to be made by the use of the present differential basis.

Prices of Finished Iron and Steel Products (Carload Lots)

Tank Plates

F.o.b. Pittsburgh mills, base, per lb.....2c. to 2.10c.
F.o.b. Chicago, base, per lb.....2.20c.

Structural Shapes

F.o.b. Pittsburgh mills, base, per lb.....2.10c.
F.o.b. Chicago, base, per lb.....2.20c.

Iron and Steel Bars

Soft steel bars f.o.b. P'gh mills, base, per lb.....2.10c.
Soft steel bars f.o.b. Chicago, base, per lb.....2.10c.
Reinforcing steel bars f.o.b. P'gh mills, base, per lb....2.10c.
Rails steel bars f.o.b. Chicago district mills, base, per lb..2c.
Common iron bars delivered New York, base, per lb....2.34c.
Common iron bars f.o.b. Chicago, base, per lb.....2c.
Refined iron bars f.o.b. P'gh mills, base, per lb..2.90c. to 3.00c.
Common iron bars delivered Philadelphia, base, per lb..2.32c.

Hot-Rolled Flats

(Pittsburgh)

Hoops, base, per lb.....2.50c.
Bands, base, per lb.....2.40c. to 2.50c.
Hoops and bands, narrower than 1-in., base per lb.....2.75c.
Strips, 10 in. and wider, base, per lb.....2.25c.
Strips, less than 10 in. wide to 3 in.....2.40c.
Strips, 3 in. wide and less, base, per lb.....2.50c.

Cold-Finished Steel

Screw stock and shafting, f.o.b. P'gh mills, base, per lb..2.80c.
Screw stock and shafting f.o.b. Chicago, base, per lb..2.80c.
Screw stock, Worcester mills, base, per lb.....3.00c.
Screw stock, base, per lb., Cleveland.....2.85c.
Shafting, ground, f.o.b. mill, base, per lb.....3.20c.
Strips, f.o.b. P'gh mills, base, per lb.....4.00c. to 4.15c.
Strips, f.o.b. Cleveland mills, base, per lb.....4.15c.
Strips, f.o.b. Chicago mills, base, per lb.....4.45c.
Strips, f.o.b. Worcester mills, base, per lb.....4.30c.

Wire Products

(To jobbers in car lots f.o.b. Pittsburgh and Cleveland)

Nails, base, per keg.....$2.85
Bright plain wire, base, No. 9 gage, per 100 lb..... 2.60
Annealed fence wire, base, per 100 lb..... 2.75
Galvanized wire No. 9, base, per 100 lb..... 3.20
Galvanized barbed, base, per 100 lb..... 3.55
Galvanized staples, base, per keg..... 3.55
Painted barbed wire, base, per 100 lb..... 3.30
Polished staples, base, per keg..... 3.30
Cement coated nails, base, per count keg..... 2.25
*Bale ties, carloads to jobbers....75, 15 and 5 per cent off list
*Bale ties, carloads to retailers....75, 10 and 6 per cent off list
Woven wire fence, base, per net ton to retailers.....67.00

Chicago district mill prices are $2 per ton above the foregoing and Chicago delivered prices are $3 per ton above the prices f.o.b. Cleveland and Pittsburgh. Birmingham mill prices $3 a ton higher; Worcester Mass., mills $3 a ton higher on products of that plant, and Duluth, Minn., mills $2 a ton higher; Anderson, Ind., $1 higher.

*F.o.b. Cleveland.

Sheets

Blue Annealed
(base) per lb.

Nos. 9 and 10, f.o.b. Pittsburgh dist. mill.....2.70c.
No. 9 and 10 (base) per lb., f.o.b. Chicago dist. mills..2.80c.

Box Annealed, One Pass Cold Rolled

No. 28 (base) per lb., f.o.b. Pittsburgh dist. mill.....3.60c.
No. 28 (base) per lb., f.o.b. Chicago dist. mill.....3.70c.

Galvanized

No. 28 (base) per lb., f.o.b. Pittsburgh dist. mill.....4.75c.
No. 28 (base) per lb., f.o.b. Chicago dist. mill.....4.85c.

Tin-Mill Black Plate

No. 28 (base) per lb. f.o.b. Pittsburgh dist mill.....3.60c.
No. 28 (base) per lb., f.o.b. Chicago dist. mills.....3.70c.

Automobile Body Sheets

No. 22 (base) per lb., f.o.b. mill.....4.75c.

Long Ternes

No. 28 (base) 8-lb. coating, per lb., f.o.b. mill.....4.90c.

Tin Plate

Standard cokes, per base box f.o.b. Pittsburgh district Mills.....$5.50
Standard cokes, per base box f.o.b. Chicago district mills 5.60
Standard cokes, per base box f.o.b. Elwood, Ind..... 5.60

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating, 100 lb. base.....$11.20
8-lb. coating I. C.... 11.50
15-lb. coating I. C.... 14.35
20-lb. coating I. C....$15.50
25-lb. coating I. C.... 17.00
30-lb. coating I. C.... 18.35
40-lb. coating I. C.... 20.35

Rivets

Large, f.o.b. P'gh and Cleveland mills, base, per 100 lb..$2.60
Large, f.o.b. Chicago, base, per 100 lb..... 2.75
Small, f.o.b. P'gh and Cleveland mills 70, 10 and 5 per cent off list
Small (freight allowed within zone limits).....70 off list

Rails and Track Equipment

(F.o.b. mill)

Rails, standard, per gross ton.....$43.00
Rails, light, billet, base, per lb.....1.80c. to 1.90c.
Rails, light rail steel, base, per lb.....1.65c. to 1.75c.
Spikes, $\frac{5}{8}$ in. and larger, base, per 100 lb.....$2.90 to $3.20
Spikes, ½ in. and smaller, base, per 100 lb..... 3.00 to 3.50
Spikes, boat and barge, base, per 100 lb..... 3.25
Track bolts, all sizes, base, per 100 lb..... 3.80 to 4.25
Tie plates, per 100 lb..... 2.35 to 2.50
Angle bars, base, per 100 lb..... 2.75

Welded Pipe

(F.o.b. Pittsburgh district mills)

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	45	19½	⅛ to ⅜	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	2 to 3	61	50½
¼ to ⅜	47	30½	¼ to ⅜	+11	+54
½	53	42½	½	21	7
¾	58	47½	¾	28	12
1 to 1½	60	49½	1 to 1½	30	14

Lap Weld, extra strong, plain ends

2	53	42	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts are increased (on black by one point, with supplementary discount of 5 per cent and (on galvanized) by 1½ points, with supplementary discount of 5 per cent.

NOTE—The above discounts on steel pipe also apply at Lorain and Youngstown, Ohio, and Wheeling, W. Va. Chicago district mills have a base 2 points less. Chicago delivered base 2½ points less.

Boiler Tubes

(F.o.b. Pittsburgh)

Lap Welded Steel		Charcoal Iron	
2 to 2¼ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1¾ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3¾ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Beyond the above discounts, 5 fives extra are given on lap welded steel tubes and 2 tens on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes
Cold Drawn

1 in.	55-58	3 and 3¼ in.	36-39
1¼ and 1½ in.	47-50	3½ and 3¾ in.	37-40
1¾ in.	31-34	4 in.	41-44
2 and 2¼ in.	22-25	4½ in and 5 in.	33-37
2 and 2¾	32-35		

Hot Rolled

3 and 3¼ in.	38-41	4 in.	43-46
3½ in. and 3¾ in.	39-42		

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tube list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Carbon under 0.30 base.....85 to 87 per cent off list
Carbon 0.30 to 0.40, base.....83 to 85 per cent off list
Plus usual differentials and extra for cutting. Warehouse discounts range higher.

Seamless Locomotive and Superheater Tubes

	Cents per Ft.		Cents per Ft.
2-in. O.D. 12 gage	15	2¼-in. O.D. 10 gage	20
2-in. O.D. 11 gage	16	3-in. O.D. 7 gage	35
2-in. O.D. 10 gage	17	1½-in. O.D. 9 gage	15
2¼-in. O.D. 12 gage	17	5½-in. O.D. 9 gage	55
2¼-in. O.D. 11 gage	18	5½-in. O.D. 9 gage	57

Prices of Iron and Steel Products and Raw Materials

Ores

Lake Superior Ores, Delivered Lower Lake Ports

Old range Bessemer, 55 per cent iron	$5.65
Old range non-Bessemer, 51½ per cent iron	4.90
Mesabi Bessemer, 55 per cent iron	5.40
Mesabi non-Bessemer, 51½ per cent iron	4.75

Foreign Ore, per Unit, c.i.f. Philadelphia or Baltimore

Iron ore, low phos., copper free, 55 to 58 per cent iron in dry Spanish or Algerian	9.00c. to 9.50c.
Iron ore, Swedish, average 66 per cent iron	9.50c.
Manganese ore, washed, 51 per cent manganese, from the Caucasus, nominal	42c.
Manganese ore, ordinary, 48 per cent manganese from the Caucasus	40c.
Manganese ore, Brazilian or Indian, nominal	42c.
Tungsten ore, high grade, per unit, in 60 per cent concentrates	$8.75 to $9.00
Chrome ore, basic, 48 per cent Cr_2O_3, crude, per ton, c.i.f., Atlantic seaboard	18.50 to 24.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	80c.

Coke and Coal

(Per Net Ton)

Furnace coke, f.o.b. Connellsville prompt	$4.15 to $4.50
Foundry coke, f.o.b. Connellsville prompt	5.00 to 6.00
Mine run steam coal, f.o.b. W. Pa. mines	1.50 to 2.10
Mine run coking coal, f.o.b. W. Pa. mines	2.00 to 2.10
Mine run gas coal, f.o.b. W. Pa. mines	2.25
Steam slack, f.o.b. W. Pa. mines	1.30
Gas slack, f.o.b. W. Pa. mines	1.50 to 1.60

Ferroalloys

Ferromanganese, domestic, 80 per cent, furnace, or seaboard, per ton	$110.00
Ferromanganese, foreign, 80 per cent, f.o.b. Atlantic port, duty paid	110.00
Ferrosilicon, 50 per cent, delivered	82.50
Ferrosilicon, 75 per cent	140.00 to 145.00
Ferrotungsten, per lb. contained metal	90c. to 95c.
Ferrochromium, 4 per cent carbon and up, 60 to 70 per cent Cr., per lb. contained Cr. delivered	11.50c.
Ferrovanadium, per lb. contained vanadium	$3.50 to $4.00
Ferrocarbontitanium, 15 to 18 per cent, per net ton	200.00

Spiegeleisen, Bessemer Ferrosilicon and Silvery Iron

(Per gross ton furnace unless otherwise stated.)

Spiegeleisen, domestic, 19 to 21 per cent.....$33.00 to $35.00
Spiegeleisen, domestic, 16 to 19 per cent..... 32.00 to 34.00
Ferrosilicon, Bessemer, 10 per cent, $39.50; 11 per cent, $42; 12 per cent, $44.50; electric furnace ferrosilicon 10 to 11 per cent, $38, furnace, with an advance of $1 per unit for material above 10 per cent.
Silvery iron, 5 per cent, $27.00; 6 per cent, $28.00; 7 per cent, $29.00; 8 per cent, $30.50; 9 per cent, $32.50; 10 per cent, $34.50; 11 per cent, $37.00; 12 per cent, $39.50.

Fluxes and Refractories

Fluorspar, 80 per cent and over calcium fluoride, not over 5 per cent silica, per net ton, f.o.b. Illinois and Kentucky mines	$17.50
Fluorspar, 85 per cent and over calcium fluoride, not over 5 per cent silica, per net ton f.o.b. Illinois and Kentucky mines	18.00
Fluorspar, foreign, 85 per cent calcium fluoride, not over 5 per cent silica, c.i.f. Philadelphia, duty paid, per gross ton	19.75

Per 1000 f.o.b. works:

	High Duty	Moderate Duty
Fire Clay:		
Pennsylvania	$43.00 to $46.00	$40.00 to $43.00
Maryland	48.00 to 50.00	43.00 to 45.00
Ohio	43.00 to 46.00	40.00 to 43.00
Kentucky	43.00 to 45.00	40.00 to 43.00
Illinois	43.00 to 45.00	40.00 to 43.00
Missouri	45.00 to 48.00	38.00 to 43.00
Ground fire clay, per ton		6.50 to 7.50
Silica Brick:		
Pennsylvania		40.00
Chicago		49.00
Birmingham		54.00
Silica clay, per ton		8.00 to 9.00
Magnesite Brick:		
Standard size, per net ton (f.o.b. Baltimore and Chester, Pa.)		65.00
Grain magnesite, per net ton (f.o.b. Baltimore and Chester, Pa.)		40.00
Chrome Brick:		
Standard size, per net ton		45.00

Bolts and Nuts

Machine bolts, small rolled threads...60 and 10 per cent off list
Machine bolts, all sizes, cut threads 50, 10 and 10 per cent off list
Carriage bolts, smaller and shorter, rolled threads 50, 10 and 10 per cent off list
Carriage bolts, cut threads, all sizes..50 and 10 per cent off list
Eagle carriage bolts.....65 and 10 per cent off list
Lag bolts.....60, 10 and 10 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....50 and 10 per cent off list
Other style heads.....30 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ x 4 in. 45, 10 and 5 per cent off list
Larger and longer sizes.....45, 10 and 5 per cent off list
Hot-pressed nuts, blank or tapped, square.....4c. off list
Hot-pressed nuts, blank or tapped, hexagons....4.40c. off list
C.p.c. and t. square or hex. nuts, blank or tapped. 4.10c. off list
Semi-finished hex. nuts:
⅜ in. and smaller, U. S. S.....80, 10 and 5 per cent off list
⅜ in. and larger, U. S. S.....75, 10 and 5 per cent off list
Small sizes, S. A. E.....80, 10, 10 and 5 per cent off list
S. A. E., ⅜ in. and larger....75, 10, 10 and 5 per cent off list
Stove bolts in packages.....80 and 5 per cent off list
Stove bolts in bulk.....80 and 5 and 2½ per cent off list
Tire bolts.....80, 10 and 5 per cent off list
Bolt ends with hot pressed nuts..50, 10 and 10 per cent off list
Bolt ends with cold pressed nuts...45, 10 and 5 per cent off list
Washers.....6c. to 6.25c. off list
Lock washers.....80 per cent off list

The foregoing are delivered prices for 1000 lb. or over, except on stove and tire bolts on which a full freight allowance is made on 300 lb. or over, for shipment within established zone limits, buyers outside of the zone paying the additional freight. Washers and lock washers are quoted f.o.b. Chicago and Pittsburgh.

Semi-Finished Castellated and Slotted Nuts

(Prices delivered within specified territories)

(To jobbers and consumers in large quantities)

	Per 100 Net S. A. E.	Per 100 Net U. S. S.		Per 100 Net S. A. E.	Per 100 Net U. S. S.
¼-in.	$0.44	$0.44	⅞-in.	$2.35	$2.40
5/16-in.	.515	.515	1-in.	3.60	3.60
⅜-in.	.62	.66	1 1/8 in.	5.55	5.80
7/16-in.	.79	.90	1¼ in.	8.90	8.90
½-in.	1.01	1.05	1⅜ in.	13.60	13.10
9/16-in.	1.38	1.42	1½ in.	18.35	18.25
⅝-in.	1.70	1.73	1⅝ in.	21.00	21.00

Larger sizes—Prices on application.

Cap and Set Screws

(Freight allowed within zone limits)

Milled cap screws.....80, 10 and 10 per cent off list
Milled standard set screws, case hardened 80, 10 and 10 per cent off list
Milled headless set screws, cut thread 80, 10 and 10 per cent off list
Upset hex. head cap screws, U. S. S. thread 80, 10, 10 and 10 per cent off list
Upset hex. head cap screws, S. A. E. thread 80, 10, 10 and 10 per cent off list
Milled studs.....75 and 10 per cent off list

Semi-Finished Steel, f.o.b. Pittsburgh or Youngstown, per gross ton

Rolling billets, 4-in. and over	$37.00 to $38.00
Forging billets, ordinary carbons	42.50
Sheet bars, Bessemer	38.00 to 40.00
Sheet bars, open hearth	38.00 to 40.00
Slabs	37.00 to 38.00
*Wire rods, common soft, base, No. 5 to ⅜-in.	48.00
Wire rods, common soft, coarser than ⅜-in.	$2.50 over base
Wire rods, screw stock	$5.00 per ton over base
Wire rods, carbon 0.20 to 0.40	3.00 per ton over base
Wire rods, carbon 0.41 to 0.55	5.00 per ton over base
Wire rods, carbon 0.56 to 0.75	7.50 per ton over base
Wire rods, carbon over 0.75	10.00 per ton over base
Wire rods, acid	15.00 per ton over base
Skelp, grooved, per lb.	2c.
Skelp, sheared, per lb.	2c.
Skelp, universal, per lb.	2c.

*Chicago mill base is $50. Cleveland mill base, $43.

Alloy Steel

(F.o.b. Pittsburgh or mill)

S. A. E. Series Numbers	Bars 100 lb.
2100* (1¼% Nickel, 10 to 20 per cent Carbon)	$3.00 to $3.25
2300 (3½% Nickel)	4.75
2500 (5% Nickel)	$6.25 to 6.50
3100 (Nickel Chromium)	3.65
3200 (Nickel Chromium)	5.50
3300 (Nickel Chromium)	7.50 to 7.75
3400 (Nickel Chromium)	6.50 to 6.75
5100 (Chromium Steel)	3.50
5200* (Chromium Steel)	7.50 to 8.00
6100 (Chromium Vanadium bars)	4.25
6100 (Chromium Vanadium spring steel)	4.25
9250 (Silicon Manganese spring steel)	3.50
Carbon Vanadium (0.45 to 0.55 Carbon, 0.15 Vanadium)	4c.
Nickel Chrome Vanadium (0.60 Nickel, 0.60 Chromium, 0.15 Vanadium)	4.50
Chromium Molybdenum bars (0.80—1.10 Chromium, 0.25—0.40 Molybdenum)	4.35
Chromium Molybdenum bars (0.50—0.70 Chromium, 0.15—0.25 Molybdenum)	3.75
Chromium Molybdenum spring steel (1—1.25 Chromium, 0.30—0.50 Molybdenum)	4.75 to 5.00

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10-in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4-in. down to and including 2½-in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

*Not S.A.E. specifications, but numbered by manufacturers to conform to S.A.E. system.

OBITUARY

William Whigham

WILLIAM WHIGHAM, vice-president Carnegie Steel Co., in charge of operations, died at his home in the Schenley Apartments, Pittsburgh, Dec. 23. Mr. Whigham was born in Mifflin Township, Allegheny County, Pa., Jan. 4, 1866. From Stevens Institute of Technology he was graduated with the degree of mechanical engineer in 1888.

WILLIAM WHIGHAM

In July, 1892, he entered the employ of the Carnegie Steel Co. as a draftsman in the armor plate department at the Homestead works. Later he worked in the same capacity in the engineering offices of the Homestead plant, whence he was promoted to steam engineer. In 1902 he became superintendent of the Howard Axle Works, a department of the Homestead plant, located at West Homestead; and in 1905 was appointed assistant to the president of the Carnegie company, in which position he continued until 1915, when he was elected vice-president in charge of operations, and a director of the company.

While in charge of operations, Mr. Whigham was responsible for some of the company's foremost achievements in the way of progress and improvement. Among these was the location, engineering and construction of the by-product coke works at Clairton, Pa., and its connecting river and rail transportation systems. This plant is the largest in the world. Mr. Whigham also was in charge of solving the river transportation problem and was prominent in the work of furthering the Ohio River improvement and canalization. During the last few years, he gave close study to marine architecture in its relation to steam craft for use on inland waters. He designed wholly or in part several steamers of the company's construction which now ply the Monongahela, Ohio and Mississippi rivers from Brownsville, Pa., to New Orleans.

Mr. Whigham also was a director of the H. C. Frick Coke Co., the Sharon Coal & Coke Co., and the Bessemer Electric Power Co. In addition to these activities, he found time to serve as chairman of the waterways committee of the Citizens Committee on City Plan of Pittsburgh. During the World War, he was a member of the United States Steel Corporation's committee on construction of the Neville Island arsenal, abandoned at the close of the war.

Mr. Whigham was a member of the Duquesne Club and other clubs, and was actively interested in the work of the Chamber of Commerce of Pittsburgh.

EUGENE A. ARNOLD, vice-president and general manager of the Struthers-Wells Co., Warren, Pa., boilermaker and foundry operator, died at his home in that city Dec. 24, aged forty-four years.

J. GEORGE BURKHARDT, president Champion Welding Co., Buffalo, died Dec. 21, in a sanitarium at Detroit, following an illness of several years. He was born in Germany in 1865 and settled in Buffalo 50 years ago.

EDWARD E. SQUIER, president and founder of the Edward E. Squier Co., distributor of foundry molding sand, St. Louis, and a pioneer Mississippi river steamboat pilot, died in St. Louis on Dec. 15. He was born in Morristown, N. J., in 1842.

H. L. PARKER, chairman Emerson Electric Mfg. Co., St. Louis, died in that city recently. He was born in Pepperell, Mass., 70 years ago and, after he was graduated from the Worcester School of Technology, entered the iron manufacturing business owned by his father. In 1892 he acquired the controlling interest in the electric company.

JAMES V. MAHER, coal operator, Cleveland, died Dec. 26, aged 60 years. In his early life he was engaged in railroad work but left this to become traffic manager of the Pressed Steel Car Co., Pittsburgh. Later he became general manager of that company. At the time of his death he was president of the Rosemary Coal Co., owner of Ohio mines.

ROBERT A. BRUCE, former head of the research department of the Hydraulic Steel Co., Cleveland, died in New York, Dec. 25, aged 53 years. At one time he was associated with the Carnegie Steel Co. and during the war he served as supervisor in shell production with the rank of colonel. Recently he had been connected with the Quintell Co., New York.

SAFFORD S. DE LANO, treasurer and a director of the American Car & Foundry Co., New York, died Dec. 27 at his residence, 137 Riverside Drive, that city, aged 68 years. For half a century he had been associated with the Car & Foundry company and its predecessors. He was also treasurer and director of the American Car & Foundry Export Co.

JOHN F. BRAYER, identified with the development of the Co-Operative Foundry Co., Rochester, N. Y., for more than half a century, and chairman of the board of directors of the company, died suddenly at his home in that city, Dec. 20, aged 72 years.

JOHN C. FRYE, for 25 years identified with the iron and steel industry in Pittsburgh, Youngstown, Buffalo and Cleveland, died at his home in Cleveland Dec. 28. He had been associated with the Lorain Steel Co., Lorain, Ohio; the Donner Steel Co., Buffalo; the Pressed Metal Radiator Co., Pittsburgh; the Valley Mould & Iron Corporation, Sharpsville, Pa., and Banning, Cooper & Co., Pittsburgh.

FREDERICK C. RIDDLE, general manager Edgewater Steel Co., Oakmont, Pa., died at his home in Oakmont Dec. 28. He was at one time general superintendent of the Inter-Ocean Steel Co., Chicago Heights, Ill.

More Blast Furnaces in Operation in the Youngstown District

The last idle blast furnace in the Haselton group at Youngstown of the Republic Iron & Steel Co. was blown in this week, giving the company five active stacks in this complement. Last week the Stewart Furnace Co. of Cleveland, operating a merchant stack at Sharon, Pa., for the production of low phosphorus and Bessemer pig iron, started its furnace. The Cherry Valley furnace at Leetonia, Ohio, of the M. A. Hanna Co., Cleveland, has also resumed, following suspension since Oct. 1.

These resumptions give the Youngstown district 30 active blast furnaces, of 45, with additional stacks to be blown in before the end of January. In July, when iron output reached a low ebb, only 12 furnaces were in blast. Current production represents fully 75 per cent of the district's iron producing capacity, as the larger furnaces are engaged.

During January the Youngstown Sheet & Tube Co. will blow in Jeannette blast furnace at the Brier Hill works, upon the completion of repairs now being made. No. 1 stack in the Ohio Works group of the Carnegie Steel Co. will also resume when current reconstruction is completed. The Carnegie company is now operating five of seven blast furnaces in the Mahoning Valley.

Features of 1924's Machine Tool Market

Railroads, Automobile Industry and Japanese General Electric Outstanding Buyers—Trend Foreseen for 1925

AGAIN in 1924 the railroads formed the backbone of what machine tool market there was. A close second in importance of purchases was the automobile industry, with its companion, the automobile accessories business. Probably the most commotion among manufacturers and dealers caused by any single transaction, however, was that brought about by the inquiry and purchases of the Shibaura Engineering Co., (Japanese General Electric Co.) Tokio, Japan, which involved several hundred tools.

The buying by railroads came from most of the important roads and from many of the smaller roads and in practically all sections of the country. It came also from foreign roads and covered a wide range of classes of machines, from medium sizes up to wheel lathes and other larger types.

A tendency was shown by railroads to lean toward production types of machines instead of sticking to the all purpose machines as in the past. This is largely brought about by the standardization by each road on certain classes or designs of locomotives and cars, which permits of making repair parts in quantities on the so-called production basis, using jigs and fixtures.

A phase of the railroad machine tool problem which came up during the past year was a plan for financing machine tool purchases in a manner similar to that employed in purchases of cars and locomotives. No specific instances of the use of this plan, however, were reported.

A source of a fair percentage of last year's business was public school boards. A number of installations running in some cases to several dozen machines were reported for vocational and other purposes.

The scope of the industrial demand is indicated by the buying by such concerns as: National Carbon Co., National Tube Co., Baldwin and American Locomotive companies, Otis Elevator Co., Wilson & Co., A. O. Smith Co., Youngstown Sheet & Tube Co., Standard Sanitary Mfg. Co., Pittsburgh Plate Glass Co., Illinois Steel Co., American Bridge Co., Lunkenheimer Co., Gary Tube Co., Cleveland Water Works, Wilson Foundry & Machine Co., Carnegie Steel Co., William Cramp & Sons Ship and Engine Building Co., International Harvester Co., Goodyear Tire & Rubber Co., Federal Can Co., Union Metal Products Co., Central Tube Co., and Miehle Printing Press Co., all buyers of a more or less conspicuous character.

Foreign industrial business emanated chiefly from Cuba, France, Japan and Russia. That from France was chiefly from André Citröen, maker of the Citröen automobile.

The second-hand machinery field affected to a considerable extent the market for new tools, many important sales being reported. Also a number of fairly large installations of machinery went into the hands of second-hand dealers, to be absorbed by users at some future time.

Machine tool expositions were reported as productive of measurable business. Among these were the Railway Supply Man's Convention at Atlantic City, that at Yale University under auspices of the American Society of Mechanical Engineers, Yale University and the New Haven Chamber of Commerce, that at steel treaters convention in Boston and the Foundry Show at Milwaukee.

Among the machine tool builders efforts were made to impress upon users some of the fundamentals of machine tools and their uses. Two or three years ago the term "Master Tools of Industry" was first employed to designate the basic place of machine tools in the scheme of things. This designation was supplemented by one to convey the idea that in buying machine tools what is really purchased is production capacity and not just so many pounds of cast iron and other metals. Efforts of the year were focused in part on emphasizing the fact that an obsolete model of machine may well be replaced by a modern machine that will show increased output for the same floor space, the same operator's wage and from the investment standpoint. Based on earning capacity the argument is also that the modern high production machine may properly be purchased out of income account rather than capital account.

With the present high cost of labor, it is becoming more and more necessary to strive for high production. The fact is leading to use of automatic machines in which movements are so fast that for loading and unloading there is promise of more general use of means for automatically caring for the machine, so that production may not be retarded by physical limitations in activity of the operator.

Another Development Noted

The unfolding of another development became discernible in the year. This is the lessened demand for the strictly single purpose machine in favor of a type aptly called by one manufacture a "single function" machine. This type in first cost must be relatively low and must show a comparatively low attendance cost in direct labor. Comparisons are with the strictly single purpose or highly special type of machine, which, while of high capacity, is relatively inflexible as to job and generally carries a high tool equipment cost. The single function machine, while showing nearly as great production as the single purpose and at as low an attendance cost, must nevertheless have a fairly wide range of capacity as to variety of work that may be done on it with low cost changes in tooling and setting up. The machine must have a minimum of working parts, quick change speed and feed boxes being replaced by pick-off gears, simple and accessible cams, or some other simple facility for making changes when needed. In other words, the machine must, to all intents and purposes, fully take the place of the single purpose machine in production, but must be capable of ready accommodation to a change in design of the piece being handled or to handle some other piece of a similar nature.

Several machines following this general idea are already on the market, such as milling machines, drill presses, gear cutters, etc. It is expected that more of these types, as well as machines for other classes of work designed with the idea in mind, will make their appearance during the coming year.

Quieter Gears

The year 1925 will also see, without doubt, further development, in the production of quiet gears, which question has latterly attained considerable importance. Gear burnishers and gear tooth grinding machines capable of turning out quiet gears in fairly large quantities will be, it is believed, more common.

As for the outlook of volume probable for the coming year, opinions differ. The year 1924 fell below 1923. Plant facilities are in excess of those of the prewar years. The average business for 1924 was about 35 per cent of capacity. As to the future manufacturers of diverse lines are faced by the problem as to just what types of their machines will be in demand. One other class manufacturer looks for a good start and has planned a schedule on an ascending scale for the first three months that is about double what was done monthly of late.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipments in carload lots from mills, these prices are given for their convenience.

On a number of items the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE, under the general heading of "Iron and Steel Markets" and "Non-Ferrous Metals."

Bars, Shapes and Plates

	Per Lb.
Bars:	
Refined iron bars, base price	3.24c.
Swedish charcoal iron bars, base	7.00c. to 7.25c.
Soft steel bars, base price	3.24c.
Hoops, base price	4.49c.
Bands, base price	3.99c.
Beams and channels, angles and tees, 3 in. x ¼ in. and larger, base	3.34c.
Channels, angles and tees under 3 in. x ¼ in., base	3.24c.
Steel plates, ¼ in. and heavier	3.34c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	3.20c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	3.55c.
Toe-calk, ½ x ⅝ in. and larger	4.20c.
Cold-rolled strip, soft and quarter hard	7.00c.
Open-hearth spring steel	4.50c. to 7.00c.
Shafting and Screw Stock:	
Rounds	4.15c.
Square, flats and hex	4.65c.
Standard tool steel, base price	15.00c.
Extra tool steel	18.00c.
Special tool steel	23.00c.
High-speed steel, 18 per cent tungsten	70c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.89c.
No. 12	3.94c.
No. 14	3.99c.
No. 16	4.09c.

Box Annealed—Black

	Soft Steel C. R. One Pass Per Lb.	Blued Stove Pipe Sheet Per Lb.
Nos. 18 to 20	4.30c. to 4.45c.	.....
Nos. 22 and 24	4.45c. to 4.60c.	5.10c.
No. 26	4.50c. to 4.65c.	5.15c.
No 28*	4.60c. to 4.75c.	5.25c.
No. 30	4.70c. to 4.95c.	.....

Galvanized

	Per Lb.
No. 14	4.70c. to 4.85c.
No. 16	4.85c. to 5.00c.
Nos. 18 and 20	5.00c. to 5.15c.
Nos. 22 and 24	5.15c. to 5.30c.
No. 26	5.30c. to 5.45c.
No. 28*	5.60c. to 5.75c.
No. 30	6.10c. to 6.25c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt	—41	—24	½ in. Butt	— 4	+19
¾ in. Butt	—46	—32	¾ in. Butt	—11	+ 9
1-3 in. Butt	—48	—34	1-1½ in. Butt.	—14	+ 6
2½-6 in. Lap.	—44	—30	2 in. Lap	— 5	+14
7-8 in. Lap	—41	—11	2½-6 in. Lap.	— 9	+ 9
9-12 in. Lap.	—34	— 6	7-12 in. Lap.	— 3	+16

Bolts and Screws

Machine bolts, cut thread, 45 and 10 per cent off list
Carriage bolts, cut thread, 35 to 35 and 10 per cent off list
Coach screws, 45 and 10 per cent off list
Wood screws, flat head iron, 75, 20, 10 and 5 per cent off list

Steel Wire

BASE PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright, basic	4.25c. to 4.50c.
Annealed soft	4.50c. to 4.75c.
Galvanized annealed	5.15c. to 5.40c.
Coppered basic	5.15c. to 5.40c.
Tinned soft Bessemer	6.15c. to 6.40c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	19⅜c. to 20⅜c.
High brass wire	19⅞c. to 20⅞c.
Brass rods	17⅜c. to 18⅜c.
Brass tube, brazed	27⅜c. to 28⅜c.
Brass tube, seamless	24 c. to 25 c.
Copper tube, seamless	25½c. to 26½c.

Copper Sheets

Sheet copper, hot rolled, 22¾c. to 23¾c. per lb. base.

Cold rolled, 14 oz. and heavier, 3c. per lb. advance over hot rolled.

Tin Plates

Bright Tin		Coke—14 x 20		
Grade "AAA" Charcoal 14x20	Grade "A" Charcoal 14x20		Prime	Seconds
		80 lb.	$6.15	$5.90
		90 lb.	6.30	6.05
		100 lb.	6.45	6.20
IC..$11.25	$8.85	IC..	6.65	6.40
IX.. 12.85	10.85	IX..	7.85	7.60
IXX.. 14.40	12.55	IXX..	9.00	8.75
IXXX.. 15.75	13.85	IXXX..	10.35	10.10
IXXXX 17.00	15.05	IXXXX..	11.35	11.10

Terne Plates

8 lb. coating, 14 x 20

100 lb.	$7.00 to $8.00
IC	7.25 to 8.25
IX	8.25 to 8.75
Fire door stock	9.00 to 10.00

Tin

Straits, pig	60c.
Bar	65c. to 68c.

Copper

Lake ingot	16¾c.
Electrolytic	16½c.
Casting	16 c.

Spelter and Sheet Zinc

Western spelter	9c.
Sheet zinc, No. 9 base, casks	12c. open 12½c.

Lead and Solder*

American pig lead	11½c. to 12½c.
Bar lead	15c.
Solder, ½ and ½ guaranteed	42½c.
No. 1 solder	40½c.
Refined solder	36½c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c. to 90c.
Commercial grade, per lb.	35c. to 50c.
Grade D, per lb.	25c. to 35c.

Antimony

Asiatic	17c. to 18c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb. 36c.

Old Metals

The market is strong, though activity is lessened, owing to holidays and stock taking. Dealers' buying prices are as follows:

	Cents Per Lb.
Copper, heavy crucible	12.50
Copper, heavy wire	12.00
Copper, light bottoms	10.25
Brass, heavy	7.75
Brass, light	6.50
Heavy machine composition	9.50
No. 1 yellow brass turnings	8.25
No. 1 red brass or composition turnings	8.50
Lead, heavy	8.50
Lead, tea	6.75
Zinc	4.25
Cast aluminum	16.00
Sheet aluminum	16.00